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Harry S. Truman Dam and Reservoir, Missouri

American Archaeology Division Department of
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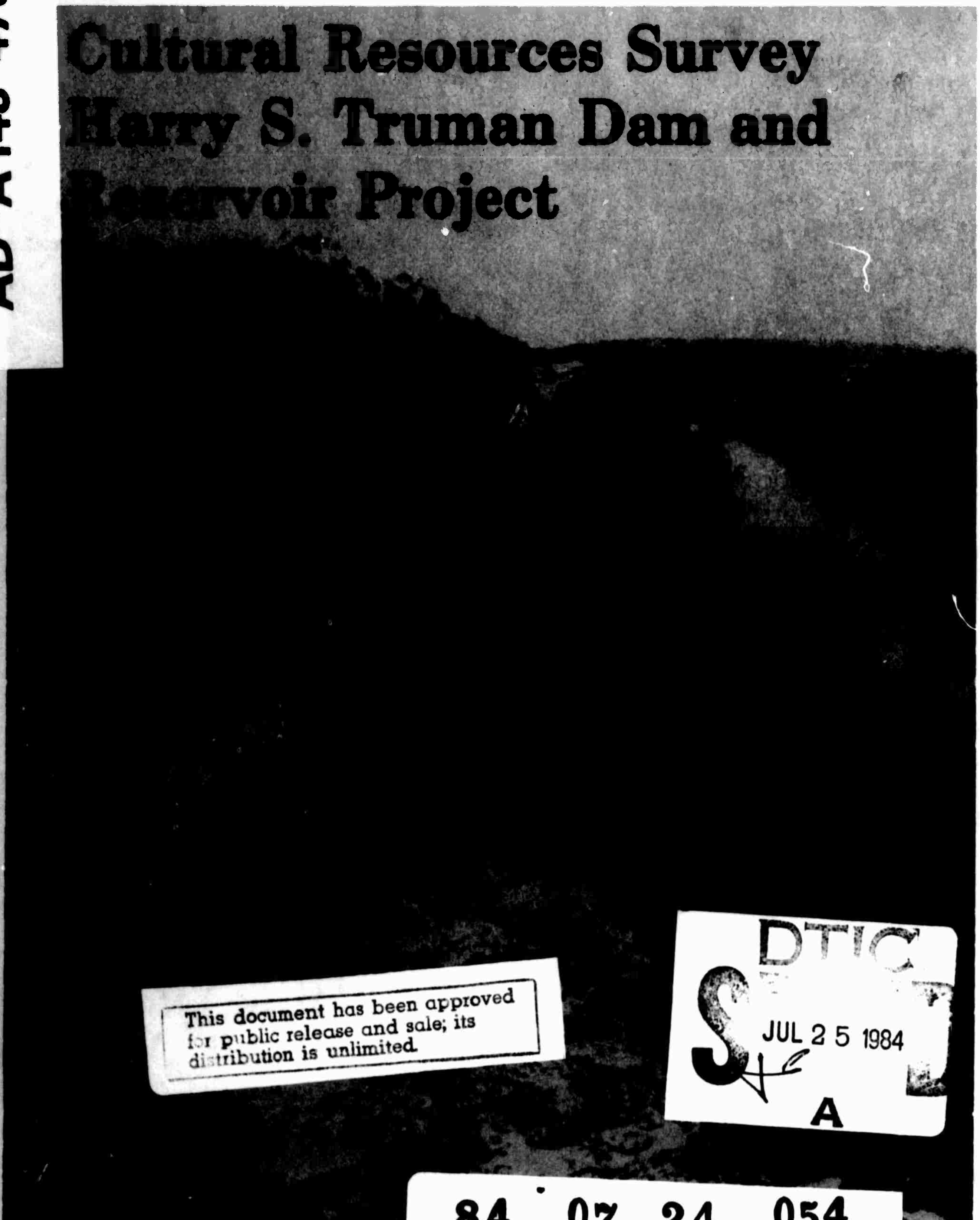
Columbia, Missouri

Cultural Resources Survey Harry S. Truman Dam and Reservoir Project



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The ten volumes report the results of a cultural resources survey in the Harry S. Truman Dam and Reservoir Project, Henry, Benton, St. Clair, and Hickory counties in southwestern Missouri. The combined volumes relate the findings of historical, architectural, archeological surveys conducted between 1975 and 1977. Volume I contains an outline of Osage River history to serve as a background for historical studies; Volume II is a historical gazeteer. Volume III contains the architectural survey of the reservoir. Volumes IV

Block 20.

through IX report the archeological survey of the reservoir. Volume IV is a description of the archeological survey, the results of that survey, and an analysis of prehistoric settlement-subsistence patterns in the reservoir area. Volume V contains analyses of surface collections obtained during the survey, and includes studies of chipped stone tools, ground stone tools, hematite, ceramics, and projectile points.

Volume VI consists of an interpretation of the Euro-American settlement of the lower Pomme de Terre River valley. Volume VII is a study of the results of preliminary testing at several sites in the lower Pomme de Terre River valley. Volume VIII contains the results of excavations in rock shelters along the Osage River. Volume IX contains studies relating to tests conducted in early occupation sites in the reservoir area, and an analysis of some Middle Archaic materials.

Finally, Volume X contains four environmental study papers, detailing the bedrock and surficial geology, the historic plant resources, and special studies of the soils and geology or portions of the reservoir.

Block 7.

Russell L. Miller, Stephen A. Chomke, Andrea L. Novick, Charles E. Cantley, Janet E. Joyer, R. A. Ward, T. L. Thompson, C. V. Haynes, F. B. King, and D. L. Johnson.

(1)

CULTURAL RESOURCES SURVEY

HARRY S. TRUMAN DAM AND RESERVOIR PROJECT

VOLUME IV

THE ARCHEOLOGICAL SURVEY

by

Donna C. Roper

A PROJECT CONDUCTED FOR THE
UNITED STATES GOVERNMENT
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REPORTS OF THE

CULTURAL RESOURCES SURVEY

HARRY S. TRUMAN DAM AND RESERVOIR PROJECT

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THE ARCHEOLOGICAL SURVEY

by

Donna C. Roper

CHAPTER I

THE GENERAL APPROACH

Four Levels of Research Questions: Definition and Rationale

The research design for the archeological survey of the Harry S. Truman Reservoir derived from two sources: (1) the orientation of more than a decade of previous research in the Pomme de Terre Valley, viz., "to outline the past environments of the Ozarks, and to understand how man adapted to, and perhaps modified, those environments" (Wood 1976b:9), and (2) the (happily) growing tendency among archeologists to regard an archeological survey as capable not merely of cataloging sites to be dug later, but of providing, in itself, data to develop and test hypotheses about human behavior (cf. Judge et al. 1975: 92).

The previous decade of research in the Pomme de Terre Valley focused on the investigation of spring bogs and on the archeology of Rodgers Shelter, a deeply stratified site reflecting a 10,500 year record of human occupation. The result is a cultural-environmental model detailing human activity at, and interaction with, the territory surrounding a single locus at one edge of this large reservoir (see Wood and McMillan 1976). But, while Rodgers Shelter is undeniably a keystone for interpreting the archeology of the broader area, it is (at any single point in time) only a single example of a single settlement type in a broader system of settlement. Further, Rodgers Shelter is spatially a single locus in a river valley forming only a small part of the central Osage River basin. Inasmuch as the west-to-east trending Osage River straddles a major ecotone in the reservoir area, it is expectable that major cultural changes should occur along an east-west gradient across the reservoir; perhaps such changes could be seen as the horizontal equivalent of similar changes which have been seen vertically as environmental change near Rodgers Shelter.

Such considerations led to the formulation (Roper and Wood 1975: 2) of three levels of questions to be answered in the Truman Reservoir research: (1) the nature of settlement systems in the Pomme de Terre Valley, (2) the relationship of this segment of the Osage River basin to the remainder of the reservoir and to western Missouri in general, and (3) the nature of general principles of how people use their natural environment and why changes occur.

Two modifications were made as the survey unfolded. First, the two substantive levels of questions seem to imply a slanted view of the reservoir, namely one from the Pomme de Terre Valley. In actuality, after the first few months of the survey, we adopted a view in which the Pomme de Terre River assumed an importance proportional only to its size relative to the area of the reservoir. That is, it became just another stream in the research design. This took place not only because, under the contract, there was no particular reason to emphasize the Pomme de Terre and every reason to do the contrary; but because most of the personnel actually engaged in the survey were not veterans of the previous research in the Pomme de Terre Valley. After getting a "feel" for the area in the Pomme de Terre Valley (and filling the specifications of an initial Purchase Order), it became apparent that the entire reservoir contained archeology just as rewarding (or even more so) than that in the Pomme de Terre Valley. Thus, the first two levels of questions frequently became blurred. They are retained here for two reasons. First, they have been stated in writing (Roper and Wood 1975: 2) and therefore should be directly answered. Second, because of the massive effort expended at Rodgers Shelter, it is important that particular care be taken to place the shelter in the perspective in its immediate context.

The second modification to the research design is the addition of a fourth level of questions. These are concerned with the actual operations of a survey – how best to carry it out in the field in order to maximize answers to our research questions. Archeologists are becoming more aware of the potential of the archeological survey to contribute directly to the study of human behavior. But in order for the survey to best realize this potential, the survey must be placed in methodological perspective in anthropological inquiry and analyzed as to how it is best conducted; i.e., the survey itself as well as its products should be evaluated. This theme will be taken up in a later section.

Four Levels of Research Questions Stated

Having briefly explained the genesis of the questions to be asked, it is now appropriate to phrase the general questions asked as the survey was begun. These are indeed general questions. More detailed questions can be derived from them, but they are not listed in this initial discussion. As will be seen below, many detailed questions arise as a result of the first operations of the survey program. These questions and consequent hypotheses are presented in the next three chapters.

The first set of questions focuses on placing Rodgers Shelter in its immediate context.

1. Does Rodgers Shelter reflect the complete cultural sequence in the Pomme de Terre Valley? For example, is the 3000 year cultural hiatus a valley-wide phenomenon? and are other, possibly contemporaneous (at any time) complexes present?

2. At any given time during its occupation, Rodgers comprised only a single settlement type. What other site types are present in the Pomme de Terre Valley for those periods represented? That is, what is the settlement system?

3. How are these site types distributed in time and space? In what kinds of places are the sites located? What is the settlement pattern?

4. How does the settlement pattern and system change? And why do these changes occur?

The second set of questions is oriented more toward placing the whole of the Pomme de Terre River Valley in perspective in the central Osage River Valley; or, more properly, with asking comparable questions for the whole reservoir.

1. Are the same cultural traditions represented throughout the reservoir, or are some of them limited to certain portions?

2. How did bearers of each cultural tradition disperse their activities? That is, what is the settlement system?

3. How are their sites distributed in time and space? That is, what is the settlement pattern?

4. Is the same range of site types located within all natural divisions by each of the cultural traditions? Or are different natural divisions used differently? That is, what is the effect of spatial variation on settlement behavior?

5. Does the use of a single natural division change over time? If so, how? How does spatial variation affect the settlement system?

Research on these substantive cultural-historical and settlement pattern questions is not possible until a more detailed delineation of questions is given. Chapter II outlines the state of archeological knowledge in Truman Reservoir and nearby areas prior to the inception of the present survey project, and suggests some specific cultural-historical and settlement pattern questions amenable to research by the survey.

The third level of questions are more theoretical. They will not be solved by the present survey, nor in the Truman Reservoir, nor in southwestern Missouri. They are a subset of the questions archeologists are beginning to use to frame their research and make it relevant to the anthropological study of human behavior.

1. How do human communities organize themselves and their activities to interact with their environment? That is, in response to what factors do settlement

systems develop? How do these interact with subsistence strategies? How is space organized? What happens when there is environmental variation over space?

2. How and why do these behavioral patterns change?

In other words, we intend to examine both the statics of human communities as seen at an archeologically defined slice of time in a reasonably small area; and the dynamics of change both over time in that same reasonably small area, and over space at a single time are to be examined (cf. Roper and Wood 1975).

Finally, as the survey progressed, it became necessary to ask how best a survey can provide information bearing on the following questions.

1. How is the survey most efficiently conceptualized and organized?

2. How is it best carried out in the field? That is, what tactics are necessary to actually implement this strategy?

The Logical Operations of the Truman Reservoir Survey

Figure 1 depicts, in flow-chart form, the sequence of operations necessary to carry out the research — although it should be noted that, due to the press of time, some of the operations that appear to be sequential were more or less simultaneous. The operations begin with the four levels of questions posed above.

The research questions just outlined lead into three types of operations which can be (and certainly were) carried out simultaneously: (1) review of the literature, (2) re-analysis of some of the survey and test excavation collections made in the nearly 15 years

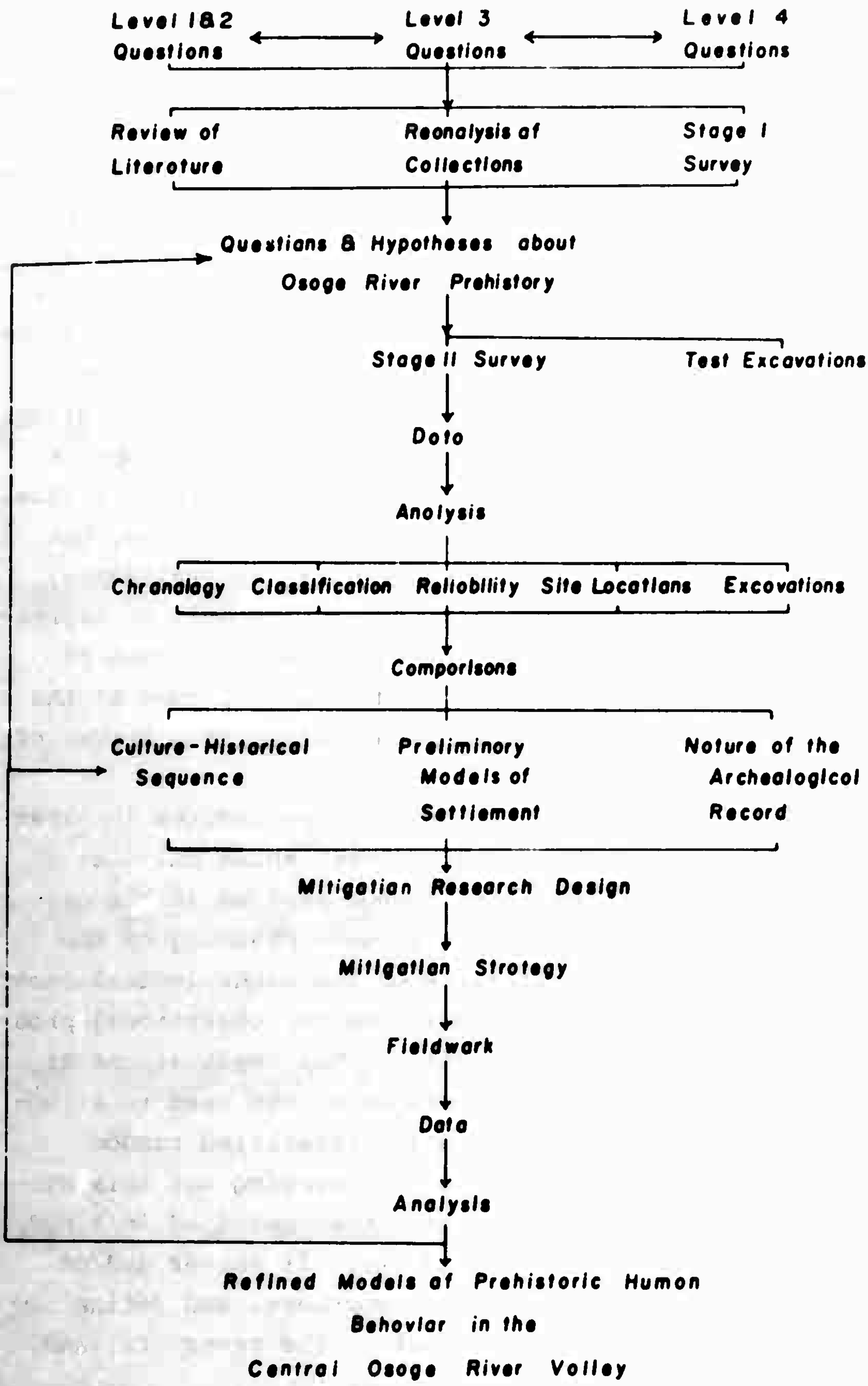


Figure 1. Logical Operations of the Truman Project.

of previous archeological research in the Harry S. Truman (formerly Kaysinger Bluff) Reservoir, and (3) Stage I survey (preliminary reconnaissance). Asking some of the questions listed for levels 1 and 2 would seem to presuppose at least minimal knowledge of the literature. While this is true, by literature review is meant a detailed search and deeper understanding than that required to know that Rodgers Shelter contains a 10,500 year record of occupation of the Pomme de Terre River Valley. Beginning actual field survey before this is complete may seem premature, but we must plead the press of time. Stage I survey will be described in detail below, but may here be described as an extensive reconnaissance, carried out throughout the reservoir, to gain an impressionistic overview of the archeological resources of the reservoir, and to become familiar with some of the operational problems inherent in conducting a survey of the area.

The end result of these three procedures is a set of detailed questions and hypotheses about culture-history and settlement-subsistence systems in the central Osage River basin, plus an understanding of the possibilities and limitations of the archeological record for answering these questions, and the operational problems to be overcome in so doing. The implications of these questions and hypotheses were then used to structure the Stage II survey — a 10% stratified random sample of the entire reservoir. Carrying out this survey, plus some test excavation, then resulted in a body of data that will be analyzed to: (1) answer and/or refine existing questions and hypotheses and define new ones for subsequent survey work in the reservoir, and

(2) define questions and hypotheses for subsequent excavations in the reservoir.

The use of the survey data for such purposes therefore requires that a number of separate kinds of analyses be carried out simultaneously: (1) specification of the temporal placement of sites; (2) development of an analytical framework for the collections — a framework that would inform us on both chronology and behavior; (3) analysis of site locations and distributions; (4) analysis of test excavation material; and (5) an evaluation of the reliability of the data collected. These different analyses provided: (1) a better understanding of the culture-history of the entire reservoir; (2) preliminary models of prehistoric human behavior along the central Osage River area, especially models of settlement systems, and (3) a better understanding of some of the possibilities and limitations of the archeological record. These results, in turn, will generate an excavation strategy which, when carried out, will provide data to be analyzed and fed back into both survey and future excavations. Excavations were, of course, outside the scope of the project reported here, but it is impossible to conceptualize a major archeological program in an area the size of Truman Reservoir without envisioning the entire sequence of the archeological process. Suggestions on this last phase are therefore to be found in the concluding section of this report. Results of other operations are presented in chapters following.

CHAPTER II

THE ARCHEOLOGY OF THE TRUMAN RESERVOIR VICINITY, CIRCA 1975

The progress of archeological survey and excavation, and a list of known sites, in the Harry S. Truman Reser- (formerly Kaysinger Bluff Reservoir) has been summarized in a document already submitted to the Corps of Engineers (Roper 1975b) and need not be repeated here. What _is_ needed here is a summary of what was known about the archeology of the Truman Reservoir area before 1975 — i.e., a synthesis of the research preceding the present investigations, for that work provides the basis for the questions, hypotheses, and implications forming the substantive portion of the research design for the current program of archeological investigations in Truman Reservoir.

Inasmuch as reservoir boundaries (and state lines) normally bear no resemblance to prehistoric boundaries, a wider range of research was consulted to help set the stage for the present Truman Reservoir work. Archeological investigations were carried out prior to inundation of the Pomme de Terre and Stockton lakes and the results of these investigations are available. Other research in the general Truman area and surrounding territory is also drawn upon where applicable. Further, some of the findings from reexaminations of some of the collections from previous work in Truman Reservoir are incorporated here.

General Location

The State of Missouri exhibits a wide range of diversity in environment, including its geology, topography, floral and faunal distributions, and hydrology. A number of classifications of this environmental diversity have been presented (e.g., Branson 1944: 350-357; Collier 1955). In the present analysis, Chapman's (1975: 1-19) archeological-physiographic regions of Missouri are employed. Under this scheme, the Truman Reservoir area straddles two regions: (1) the Ozark Highland Region, and (2) the Western Prairie Region (Fig. 2). The Ozark Highland Region roughly corresponds to the Salem Plateau of Bretz (1965: 11) and is characterized by deeply incised streams with steep relief along narrow valley walls, and tightly meandering streams. Oak-hickory forests with prairie openings in some upland areas were the dominant vegetation. The Western Prairie Region, in contrast, corresponds with Bretz's Springfield Plateau (Bretz 1965: 12), and is characterized by broader river valleys and less deeply entrenched streams than the Ozark Highland Region. Streams form less tortuously winding meander patterns, and relief along valley walls is more rolling and gentle. Prior to modern agriculture, the native vegetation of this region was tall-grass prairie, with oak-hickory gallery forests along the streams and covering the valley walls.

The contact between these two regions is at the Eureka Springs Escarpment, a feature which marks the contact between the Mississippian age bedrock in the Springfield Plateau on the west, and the Ordovician age bedrock with scattered monadnocks of Mississippian age

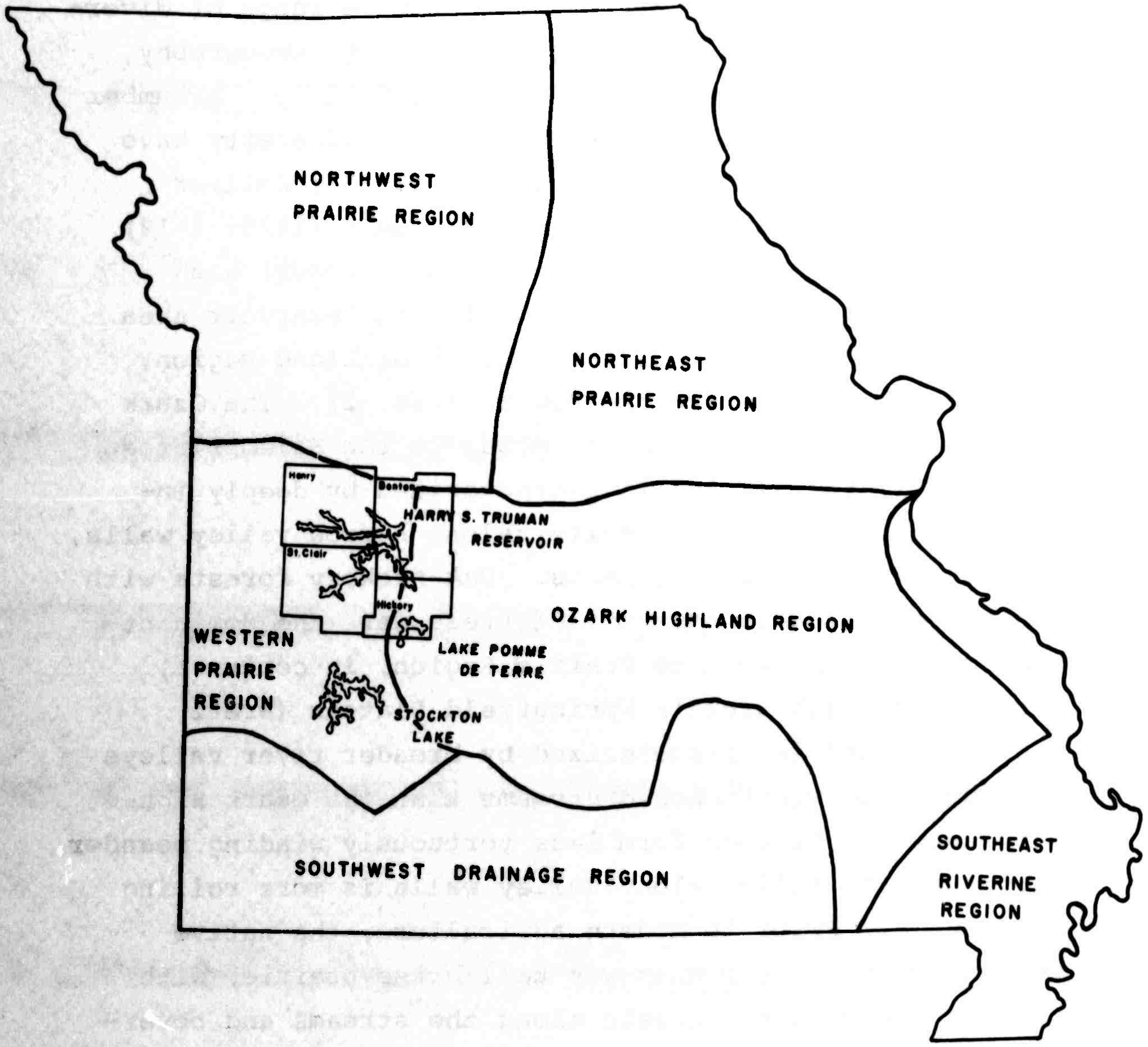


Figure 2. Relation of Truman Reservoir to Archeologic Physiographic Regions of Missouri.

in the Salem Plateau on the east (Bretz 1965: 13-14). A more detailed consideration of the basic physiography of the Truman Reservoir vicinity is given by Ward and Thompson in Volume X, Part I of the Truman Reservoir Cultural Resources Survey report.

Given this environmental diversity, it requires little archeological knowledge to suspect that there might also be archeological diversity correlating with these areas. Confirmation of such diversity and its implications was, of course, one of the goals of the present project (see Chapter I, this volume).

Temporal Frameworks

Most syntheses of Missouri archeology have employed the traditional temporal framework in common use in the Eastern United States. This system employs a quadripartite division of the entire cultural sequence into Paleo-Indian, Archaic (subdivided into Early, Middle, and Late), Woodland (Early, Middle, and Late), and Mississippian periods. The temporal correlations of these periods are indicated in the first column of the accompanying chart (Fig. 3).

Examination of collections, particularly of ceramics, from sites excavated in St. Clair County, in the Western Prairie Region, during the early years of Kaysinger Reservoir research soon made it obvious, however, that this framework was quite strained, particularly toward the end of the sequence. In fact, it became obvious that the western part of the reservoir (i.e., that part in the Western Prairies Region) was peripheral to cultural developments on the Central Plains, rather than the

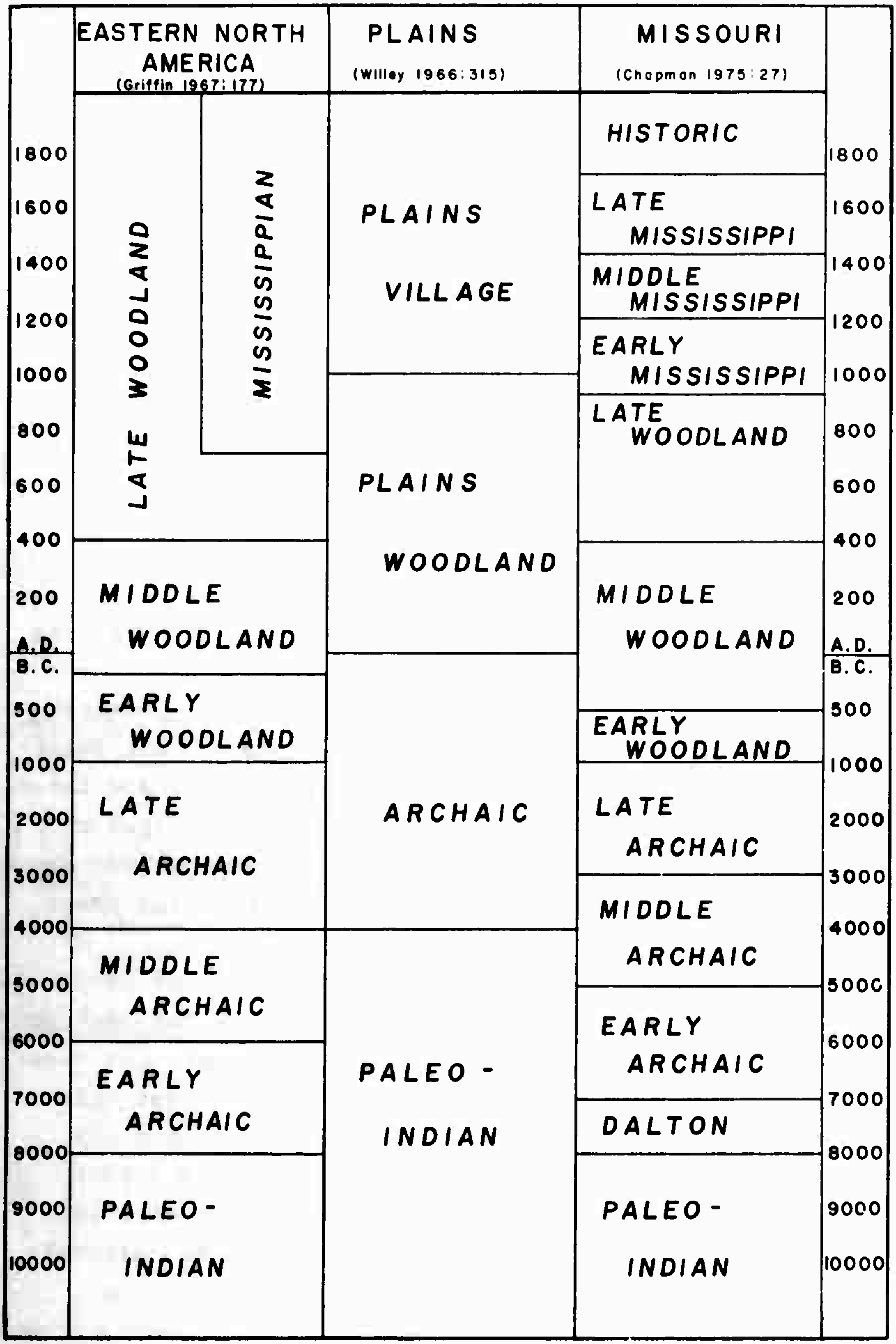


Figure 3. Basic Culture Sequences for Missouri.

eastern United States, while the eastern part of the reservoir seemed referable to the eastern woodlands sequence. For this reason, use of eastern United States taxonomy as an organizing framework is simply not realistic for the entire reservoir area. Therefore, in the second column of the chart (Fig. 3), the basic sequence is outlined for the Central Plains (Willey 1966: 315), based essentially on Wedel (1961: 280).

Chapman's temporal perspective for Missouri in general is presented in the last column of the same figure. It is closely related to Griffin's general eastern United States scheme, differing mainly in the addition of Dalton as a separate period; in subdivisions of the Mississippian; and an adjustment of dates. It is apparent, therefore, that Chapman's Missouri scheme will be only partially applicable to the Harry S. Truman Reservoir. Furthermore, dates for each of the cultural manifestations in Truman Reservoir must be derived from an examination of the Truman data per se, rather than projected from general time bands as shown (Fig. 3).

A Synopsis of Truman Reservoir Archeology - 1975

The major sources of material for the following synopsis of Truman Reservoir archeology prior to 1975 are a series of reports to the National Park Service on surveys and excavations conducted between 1959 and 1974, as well as a synthesis of work in the Pomme de Terre Valley arm of the reservoir by Wood and McMillan (1976). This material is supplemented by reports on surveys in adjacent reservoirs, particularly Stockton and Pomme de Terre lakes, and by a number of brief journal articles on each of these investigations.

The major sites on which the following discussion is based are Rodgers Shelter (23BE125), Blackwell Cave (23HI172), Phillips Spring (23HI216), Saba Shelter (23BE151), the Fulton Site (23BE152), and a series of small rockshelters in St. Clair County. The distribution of these sites is shown on the following map (Fig. 4). To better visualize the relationships between the sequences contained in these sites, the basic cultural sequences, as understood from the respective site reports, plus basic stratigraphy, and available radiocarbon dates, have been graphed (Fig. 5). Radiocarbon dates are also tabulated (Table 1).

PALEO-INDIAN

The Paleo-Indian period in both the eastern United States and the Great Plains is normally defined by the presence of fluted point forms - particularly the Clovis point. Such remains are so far nearly absent from the Truman Reservoir vicinity. No excavation or survey in the general area has as yet recovered a single fluted point. The state-wide distribution study of fluted points in Missouri (Chapman 1973) records only a single fluted point in each of Benton, Cedar (Smail 1951), and St. Clair counties (Chapman 1975: 67), and none in either Henry or Hickory counties. All three recorded points are in private collections.

Three alternative explanations may be posed for the nearly exclusive absence of fluted point forms in the area: (1) they are not present, (2) the unsystematic surveys conducted so far have not observed them - i.e., there is sample error, or (3) sites with fluted points are buried and are thus difficult to observe. One

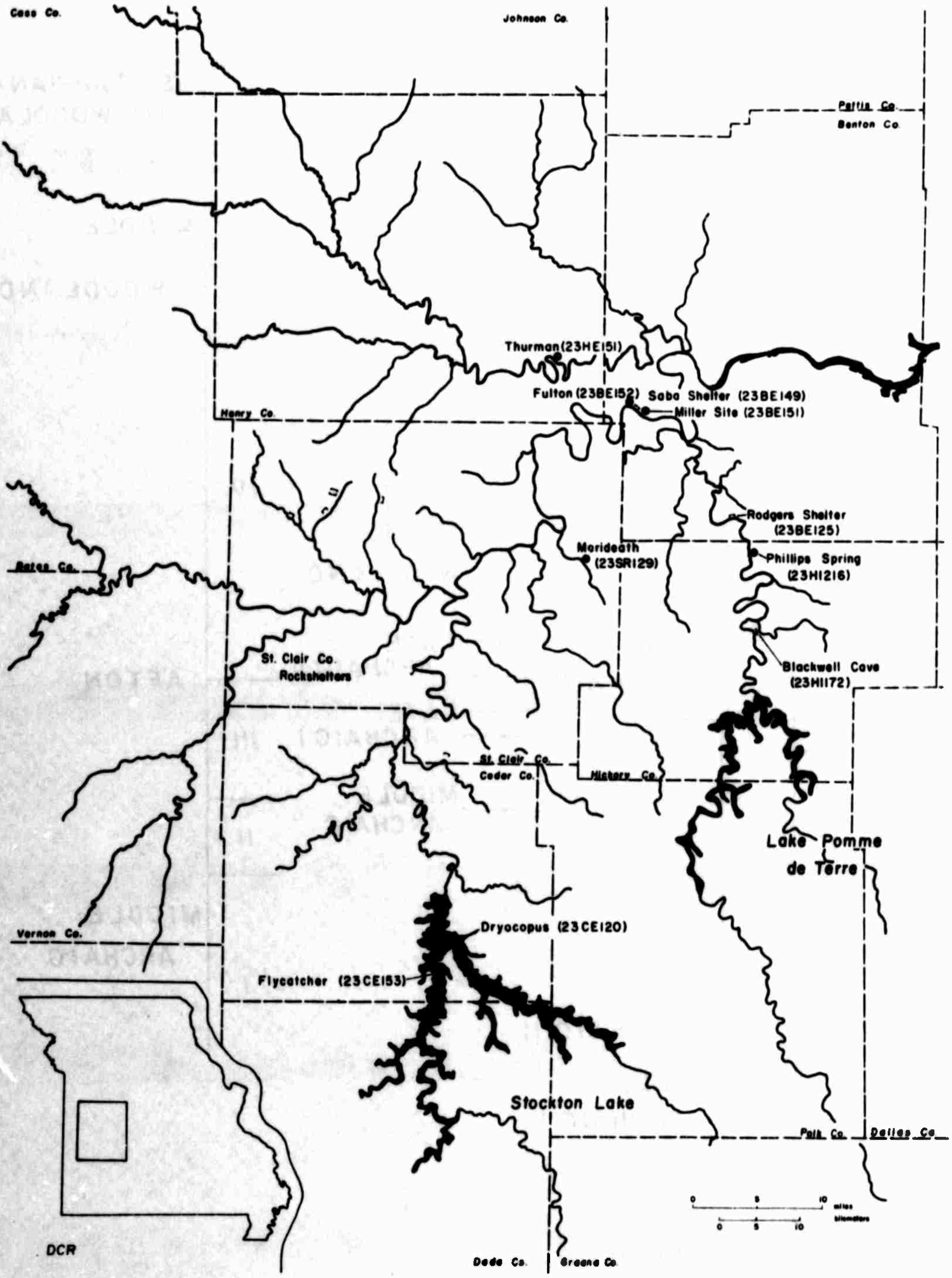


Figure 4. Sites discussed in the text.

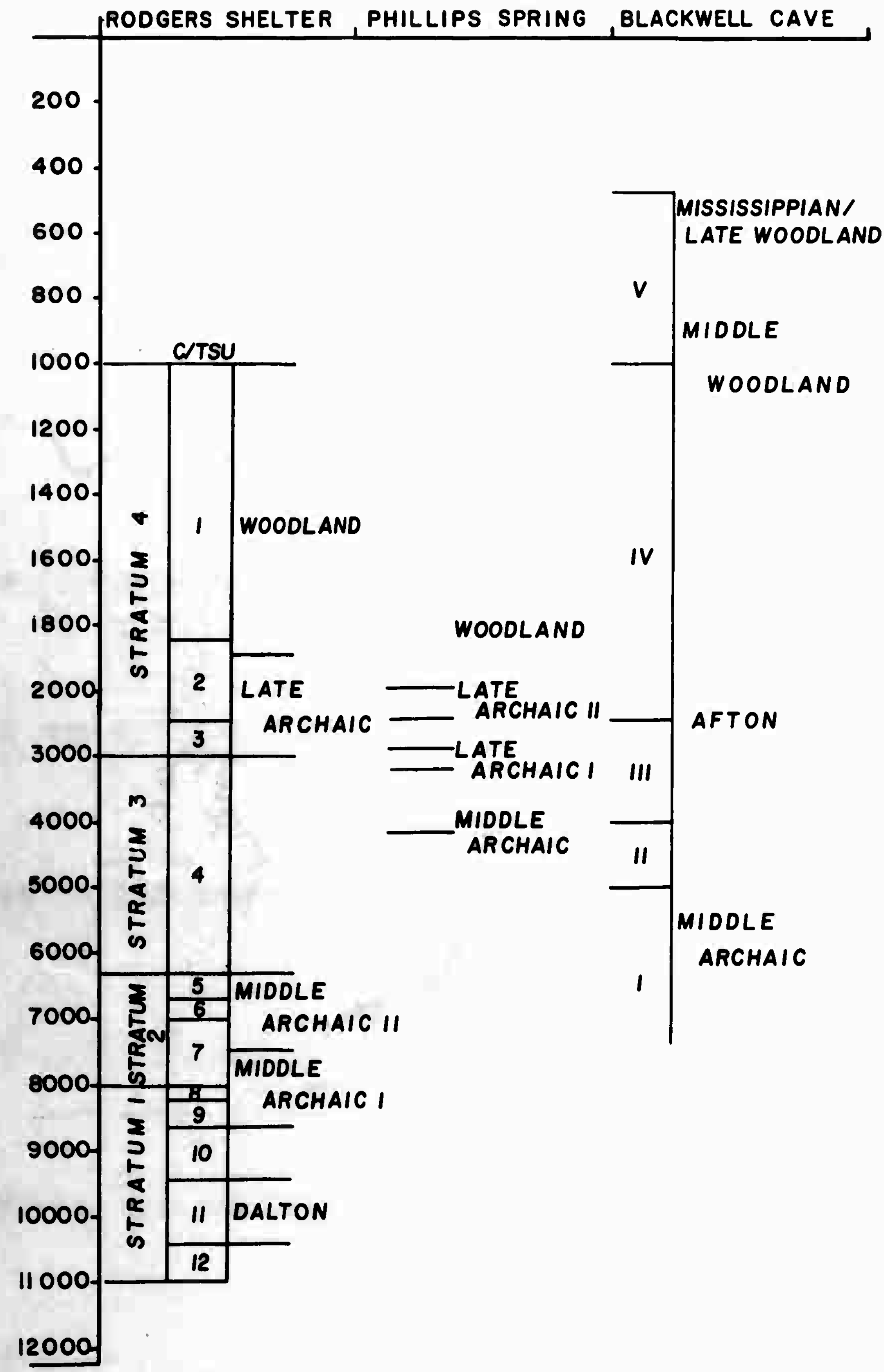


Figure 5. Stratigraphy of Stratified Sites.

TABLE 1

Archeological Radiocarbon Dates
in the Truman Reservoir Vicinity

Site No.	Site Name	Sample No.	Age (B.P.)	Reference
23HI216	Phillips Spring	SMU-237	270±50	Chomko 1978: 240
23HI135	Holbert Bridge Mound	Gx-569	385±105	Wood 1976c: 311
23DA226	Divine Mound	Gx-678	485±90	Wood 1976c: 312
23HI135	Holbert Bridge Mound	Gx-558	520±135	Wood 1976c: 311
23CE153	Flycatcher Site	M-1899	560±100	Crane & Griffin 1968: 84
23HI172	Blackwell Cave	M-1930	720±110	Crane & Griffin 1968: 86
23DA226	Divine Mound	Gx-677	840±75	Wood 1976c: 312
23CE150	Sorter Mound	M-1932	860±100	Crane & Griffin 1968: 86
23CE148	Umber Point Mound	M-1902	950±120	Crane & Griffin 1968: 85
23CE153	Flycatcher Site	Gx-750	1235±95	Wood 1976c: 312
23BE149	Saba Shelter	Gak-1176	1400±100	Vehik 1974: 39
23CE152	Bowling Stone Mound	M-1967	1560±140	
23BE3	Wray-Martin Mound	Gx-559	1855±215	Wood 1976c: 311
23BE145	Boney Spring	Tx-1471	1900±80	Wood 1976d: 102
23BE145	Boney Spring	Tx-1470	1910±80	Wood 1976d: 102
23BE145	Boney Spring	Tx-1472	1920±50	Wood 1976d: 102
23HI216	Phillips Spring	SMU-234	1990±50	Chomko 1978: 240
23BE149	Saba Shelter	Gak-1177	2070±100	Vehik 1974: 39
23BE3	Wray-Martin Mound	Gx-570	2175±380	Wood 1976c: 311
23HI216	Phillips Spring	SMU-236	2340±80	Chomko 1978: 240
23HI172	Blackwell Cave	M-1929	2680±150	Crane & Griffin 1968: 86
23HE151	Thurman	M-2110 M-2111	2690±200	Crane & Griffin 1972b: 204
23HI216	Phillips Spring	SMU-238	2910±50	Chomko 1978: 240
23HI216	Phillips Spring	SMU-235	3050±60	Chomko 1978: 240
23HI172	Blackwell Cave	Gx-749	3100±85	Falk 1969: 48
23HI216	Phillips Spring	SMU-102	4240±80	Chomko 1978: 240
23HI216	Phillips Spring	SMU-98	4310±70	Chomko 1978: 240
23BE125	Rodgers Shelter	M-2332	5100±400	Crane & Griffin 1972a: 159
23BE125	Rodgers Shelter	M-2281	5200±200	Crane & Griffin 1972a: 159
23BE125	Rodgers Shelter	ISGS-35	6300±590	Coleman 1972: 154
23BE125	Rodgers Shelter	Gak-1171	7010±160	Ahler 1976: 124
23BE125	Rodgers Shelter	Gak-1172	7490±170	Ahler 1976: 124
23BE125	Rodgers Shelter	M-1900	8030±300	Crane & Griffin 1968: 84-85
23BE125	Rodgers Shelter	Gak-1170	8100±140	Ahler 1976: 124
23BE125	Rodgers Shelter	A-868A	8100±300	Haynes, Grey, & Long 1971: 13
23BE125	Rodgers Shelter	M-2333	10,200±330	Crane & Griffin 1972a: 159
23BE125	Rodgers Shelter	ISGS-48	10,530±650	Coleman 1972: 154

objective of the survey was to eliminate some of the competing explanations for the negative evidence so far available.

DALTON

If Paleo-Indian is scarce, Dalton is only slightly better represented. The period is defined by the presence of a distinct ground-concave based, eared lanceolate point that is frequently serrated and beveled. Basal thinning and lateral grinding of the haft element are also common on Dalton Points.

The major evidence for Dalton in the Truman Reservoir area is from Rodgers Shelter in the Pomme de Terre River Valley. Here Culture/time stratigraphic unit 11, in the lower portion of Stratum 1, is assigned to a Dalton occupation. One Plainview (Wood and McMillan 1967: 54; 1969: 2) and a number of Dalton points are referable to this occupation. The cultural pattern is one of a series of small campsites, no larger than 10 m in diameter, centered around a hearth (McMillan 1976: 223-224). A number of discrete and superimposed occupations were effectively preserved by deposition on the rapidly aggrading floodplain beneath the shelter. Two radiocarbon dates are available for this occupation: 10,200 ± 330 B.P. (M-2333) and 10,530 ± 650 B.P. (ISGS-48). McMillan (1976: 213) suggests an approximate temporal span of 10,500 to 9500 B.P. for the Dalton occupation at Rodgers.

Little other evidence of Dalton occupations in the reservoir area was available at the start of the survey. Chapman (1975: 99) lists only scant evidence for Dalton in this part of the Ozark Highland Region, and only a single Dalton point from the surface of a small cave in the Western Prairie Region. He concludes that "it would appear that there was very little use if any of the Upper Osage Locality by Hunter-Foragers during the Dalton period." Wood (1957: 10) reports a Dalton point from the western part of Hickory County, and one from 23HI23 in the Pomme de Terre Reservoir (Wood 1961: 100).

The evidence available in 1975 for Dalton occupation of the Truman Reservoir vicinity was therefore sparse indeed. Yet the repeated occupation of Rodgers Shelter by Dalton peoples, plus sporadic finds of Dalton points over the reservoir area, argues for some sort of regular use of the area. Surely Rodgers was not the only camping place. The same three explanations for the scarcity of Dalton material in the reservoir area may thus be postulated: (1) it is not there, as suggested by Chapman, (2) it is underrepresented in existing survey records because it has not been observed, or (3) it is buried. Again, an objective of the survey was to collect evidence to use in helping decide among these three possibilities.

In addition to establishing the fact of Dalton presence or absence in the Osage Basin, several questions about Dalton (assuming it were to be found) can be addressed: (1) McMillan (1976: 224) has concluded that, at the time of the Dalton occupation of Rodgers Shelter, "we simply do not know how other components in the overall Dalton settlement system in western Missouri may have compared with or complemented the manifestations at Rodgers Shelter." Generating the data to determine the position of Rodgers Shelter in the overall Dalton settlement system presupposes a survey, and perhaps testing of some sites, to find the sites that will inform on the question, as well as the analyses of collections from (and the locations of) those sites. A controversy is currently raging in the literature over the form of Dalton settlement patterns in Arkansas and nearby Missouri (Schiffer 1975; Morse 1975; Price and Krakker 1975). Investigation of new evidence from a different area may help shed some light on the problem. (2) In any case, the general research questions stated in Chapter 1 should be adapted to the specific Dalton case: Where are the sites located? What are the spatial boundaries of Dalton? Or can they be discovered? Is it a forest adaptation? Does it extend into the Western Prairie Region? If so, are these two major natural divisions exploited in a similar fashion? Or are they different?

EARLY ARCHAIC

The definition of the Paleo-Indian and Dalton periods is not really as simple as it has just been made to appear, but the problem becomes more acute for the Early Archaic period. Just what are the Paleo-Indian, Dalton, and Early Archaic periods? (1) Are they merely dominant point forms, as implied above? This is certainly one of the definitions abundant in the literature. (2) Are they time periods? This is the definition used by Chapman (1975). In fact, Chapman (1975) sees a Paleo-Indian occupation in lower Stratum 1 at Rodgers, not Dalton, and a strong Early Archaic occupation (the latter is here discussed as Middle Archaic). The apparent basis is the fit of the radiocarbon dates to the periods he defines, not the points or the adaptations represented.

(3) Or are Paleo-Indian, Dalton, and Early Archaic different kinds of adaptations to late glacial and immediate post-glacial environments?

Adopting any one of these definitions is fraught with difficulties. Use of time periods leads to the problem of securing dates to place each component. Since obtaining dates, especially with survey data, is generally done by cross-dating artifact types, one might just as well define the periods on the basis of those artifact styles. But this, too, can lead to problems. Perhaps certain point styles persist for long periods of time and cross-cut several distinct shifts in adaptation. Surely this could be difficult to recognize. One seems to have to pick a definition and stick with it. For present purposes, the artifact style definition is selected as the one most meaningful for organizing survey collections and generating a research design for helping solve some of the puzzles noted earlier.

Using the type-fossil approach, a variety of point styles are associated with Early Archaic in southwestern Missouri – among them, Rice Lobed, Graham Cave Side-Notched, Hidden Valley Stemmed, and several lanceolate forms (see Chapman 1975: 127-135). All of these forms occur in Stratum 2 at Rodgers Shelter (Ahler 1971: 8-20) but are assigned to a Middle Archaic occupation. In fact, Culture/time stratigraphic unit 10 at Rodgers, assigned a temporal span of 9500 to 8600 B.P., shows little occupation and is placed between the Dalton (C/t.s.u. 11) and the first Middle Archaic (C/t.s.u. 9) occupations. An obvious question for research on a reservoir-wide basis, therefore, concerns what was happening during this period. Were people living anywhere in the reservoir area? If so, how are their occupations recognized? Can the settlement/subsistence system of the Early Archaic inhabitants be reconstructed (assuming for the moment we were to find evidence of their former presence) and do these systems vary over space?

MIDDLE ARCHAIC

A major horizon marker for the Middle Archaic period is the presence of large side-notched points for which Chapman (1975: 158) has used the name Big Sandy Notched. These are not the only points associated with the Middle Archaic period, however, nor are they only associated with Middle Archaic.

Evidence for a Middle Archaic occupation in the Truman Reservoir area is somewhat more abundant than that for earlier occupations. Culture/time stratigraphic units 5 to 9, at Rodgers Shelter, correlating with upper Stratum 1 (C/t.s.u. 8 and 9) and Stratum 2 (C/t.s.u. 5-7) are assigned to a Middle Archaic occupation. Throughout the 2300 year span established from six radiocarbon dates for the Middle Archaic at Rodgers (8600 to 6300) B.P. (see Table 1), the shelter has been interpreted by McMillan (1976: 224-225) as a base camp for a wide variety of extractive and domestic tasks. During this time, McMillan (1976: 228-229) hypothesizes that:

> there was a gradual shift during the mid-Holocene from a forest edge to a prairie biotype and back. It is believed that a vegetational change of this magnitude had a pronounced effect on the past human populations in western Missouri and accounts in part for the changes in subsistence and settlement strategies seen in the archaeological record.

Floral and faunal remains from the shelter suggest "that the Middle Archaic populations were facing a deteriorating environment where increased incidence of severe drought was helping to transform much of the area's arboreal habitat to grass" (McMillan 1976: 230). The early parts of the Middle Archaic occupation (Middle Archaic I) at Rodgers focused on the procurement of small game – especially squirrel – while such bison bones as are found occur exclusively in these levels. Hickory nuts, walnuts, and hackberry are prominent vegetal foods. Later, during the Middle Archaic (Middle Archaic II), there is an even greater reliance on rabbits and other small mammals, and freshwater mussels are first taken on a regular basis.

Immediately after this Middle Archaic occupation, Rodgers Shelter was unoccupied for over three millennia (6300 to 3000 B.P.) – a hiatus corresponding with Stratum 3, or Culture/time stratigraphic unit 4 of the deposits. Analysis of sediments suggests a maximum in erosion and a minimum of vegetation cover on the hillslope above the shelter at that time (Ahler 1976: 137).

Rodgers Shelter, of course, is not the only major component of the Middle Archaic period to be reported. Among them is an occupation at Phillips Spring (23HI216). Phillips is a multi-component open-air site a few miles upriver from Rodgers on the Pomme de Terre. The earliest occupation, dated about 4280 B.P. (Chomko 1976: 108), was during the Middle Archaic period and is represented by a feature of freshwater mussel shell and fire-cracked rock. A single expanding stemmed point – type unnamed – was associated with this feature. Although this occupation is (so far) poorly known, part of its significance lies in the simple fact that apparently it occurred during the major cultural hiatus represented by Stratum 3 at Rodgers Shelter.

Other Middle Archaic components in the Truman Reservoir area may include Stratum I at Blackwell Cave (Wood 1961; Falk 1969), the Miller site (Vehik 1974: 26), and Saba Shelter (Vehik 1974). Minor Middle Archaic occupations have been noted in shelters in St. Clair County (Chapman 1975: 171-172) in the Truman Reservoir, and in several shelters in Stockton Lake (McMillan 1968: 7). In addition, Middle Archaic material was found during surveys in Stockton (Powell 1962) and Pomme de Terre (Chapman 1954, Wood 1961) lakes.

Unlike the previous periods in Truman Reservoir prehistory, therefore, evidence is somewhat more regularly available and more widespread for a Middle Archaic occupation of the area. Unfortunately, except for Rodgers Shelter and the testing at Phillips Spring, little systematic work has been done on this period. At least one first level question relevant to this period (Chapter I) has been stated, viz.,: is the 3000+ year cultural hiatus a valley-wide phenomenon? The evidence from Phillips Spring suggests that it is not. Given the apparent shift in environmental conditions a shift in the settlement pattern might be suspected. Therefore, this is posed as a further question for study: was the settlement pattern indeed shifting? If so, how? In the following chapter a hypothetical explanation for how such a shift may have taken place is posed. Going a step further, if the Ozark Highland Region was experiencing a shift toward more open vegetation cover, the Western Prairie Region should have been undergoing a somewhat more dramatic change. Some Middle Archaic remains have been found in the Western Prairie Region, but so far, nothing is known about the nature of the Middle Archaic occupations there. Are base camps and perhaps the whole settlement system represented? Or was the Western Prairie Region used only for special purposes, such as hunting? Did the same types of shifts as are postulated for Rodgers Shelter occur here also? And is this sequence supported by data from other sites in other portions of the reservoir?

LATE ARCHAIC

The Late Archaic in both the Western Prairie and Ozark Highland regions is also recognized by a series of point styles - among them Afton, Smith Basal-Notched, Etley, several square-stemmed varieties, Sedalia, and other forms. All are present in the Late Archaic occupation at Rodgers Shelter (C/t.s.u. 3 and lower 2 - in the lower part of Stratum 4) as well as at other sites in the reservoir.

The Late Archaic period at Rodgers (about 3000 to 2000 B.P.) is marked by a continuation of the apparent base camp function of the site. However, the subsistence emphasis apparently shifted back to deer hunting, plus acquisition of turtles and mussels (McMillan 1976: 225-226). McMillan (1976: 230) concludes that "The Late Archaic adaptation reflects a return to environmental conditions supporting deer herds and, concomitantly, to a procurement system designed to exploit these animals."

Phillips Spring was occupied twice during the Late Archaic period - the first time, sometime between about 3050 and 2910 B.P., the second, between about 2340 and 1990 B.P. Basal-Notched, square-stemmed, and corner-notched points are all present in this occupation. Phillips was most intensively occupied at this time.

As at Rodgers Shelter, Phillips apparently was the scene of a variety of domestic and extractive activities. Deer, mussels, and hickory nuts appear to have been important food items — again, paralleling the Late Archaic occupation at Rodgers Shelter. This same pattern extended through both Late Archaic occupations at Phillips.

Blackwell Cave, just a few miles south of the other two sites, also contained a substantial Late Archaic occupation. Wood (1961: 70) defined a "Component B" in Strata III and IV at Blackwell characterized by the Afton point — a thin, corner-notched, angular-bladed point. Falk (1969: 88) also reports other types of corner-notched points and basal-notched points associated with the Late Archaic occupation in the cave. Faunal trends are similar to those at Rodgers and Phillips — i.e., deer is prominent, and aquatic resources are used more than in the previous, Middle Archaic, occupation of the cave.

Other excavated sites in Truman Reservoir also have Late Archaic components. The initial occupation of the Merideath Site (23SR129) took place during the Late Archaic period and is characterized by corner-notched points and a basal-notched point. The Thurman Site (23HE151) has a Late Archaic occupation — made more interesting by the presence of both pit features and post molds (Falk and Lippincott 1974). Corner-notched points predominated at the Thurman Site. A minor occupation by Late Archaic peoples is also apparent at Saba Shelter (Vehik 1974). Late Archaic occupations were also represented in shelters in St. Clair County (Chapman 1975: 186-190), as well as in Stockton Lake (McMillan 1968: 7) where, again, stemmed, corner-notched, and basal-notched points are horizon markers for the period. Surveys of both Stockton (Powell 1962) and

Pomme de Terre (Chapman 1954, Wood 1961) lakes also revealed much evidence of Late Archaic occupation.

In sum, the Late Archaic is well represented throughout the reservoir, and in fact may be better represented in excavated sites than is indicated above. Unfortunately, corner-notched projectile points seem to be common from the Late Archaic through to the Late Woodland period. Any number of reports on limited test excavations at sites other than those listed above (e.g., Falk and Lippincott 1974: 71-109) are unable to assign the occupation because of the lack of temporal control within the corner-notched point category. This problem cannot possibly be addressed with survey data alone. Although stylistic studies of corner-notched points could be done, what is really needed is such a study carried out using a well-controlled stratigraphic sample. At this point, it can only be suggested as a problem to be studied with well-dated excavated collections.

Beyond this, however, there is a suggestion of functional differentiation between sites, but as yet, there are few clues to its significance. In other words, was the Late Archaic settlement system more complex than that of previous occupations? What is the structure of the Late Archaic settlement system? How do sites with other Late Archaic point styles relate to the so-far excavated sites?

WOODLAND

The Woodland period in North America is traditionally recognized by the addition of pottery to the material culture inventory. Correlating with this in southwestern Missouri is the continuation of corner-notched points, and the presence of a variety of other forms including Rice Side-Notched, Gary, and Langtry points. The traditional eastern United States framework divides the Woodland period into Early, Middle, and Late Woodland. The Middle Woodland is the most readily recognized of these, having a series of distinct, often dentate stamped, ceramic types, plus several recognizable point forms — most prominent among them the Snyders, a corner-notched form.

Very little Middle Woodland material is recognized in the Truman Reservoir area. Only "a few sherds" (McMillan 1976: 226) from Rodgers Shelter appear to be Middle Woodland. Wood (1961: 102) assigns Component C in Stratum IV at Blackwell Cave to the Middle Woodland, an identification also noted in Falk's (1969: 88) work at the same site. A few "Hopewellian" sherds were recovered from the Tater Hole and Griffin shelters in Stockton Reservoir (McMillan 1966: 182), as well as from a number of sites in St. Clair County (Chapman 1965b). The nature of the Middle Woodland presence in the Truman Reservoir vicinity is not as yet well understood. McMillan (1968: 10) concluded that

> There were minor to substantial occupations in some of the shelters during Middle Woodland times by peoples who seem to be most closely related to Hopewellian groups in northeastern Oklahoma.

This is the only suggestion as to the nature of a poorly represented occupation in the Reservoir area. Yet Middle Woodland occupations are represented all around — in the Kansas City area (Wedel 1943, Katz 1974, Johnson, ed., 1976), the Missouri River valley in central Missouri (Kay 1975), and the southeast Kansas-northeast Oklahoma area (Marshall 1972, Bell and Baerreis 1951).

No open site components have so far been assigned to the period, and it is represented only sparsely in a few shelters. How do these sites relate to the Middle Woodland occupations in surrounding areas? Can the suggestion made by McMillan (1968: 10) that the Middle Woodland ceramics from Stockton Lake sites are most like those from northeast Oklahoma be supported or refuted? Is the Middle Woodland presence in the central Osage basin a special purpose occupation (e.g., hunting camps), or is a full settlement cycle represented? How extensive is the occupation, and when did it occur?

Other than Middle Woodland, the remaining ceramic occupations of the Truman Reservoir area are very poorly known; this in spite of their ubiquity. Various corner-notched points, as well as Gary, Langtry, Rice Side-Notched, and a wide variety of small triangular notched and unnotched forms are all characteristic of this later occupation. Ceramics occur mostly in shelters and show a wide variety in paste, temper, form, and surface treatment (but are uniform in largely lacking decoration). Nevertheless, the sequence is neither well-dated nor well understood – perhaps because it cannot be understood without reference to developments outside the Truman Reservoir area, and frequently outside the Osage River basin. The Ozark Highland and Western Prairie regions are discussed separately for this purpose.

Ozark Highland Region

Wood (1961: 104-110) attempted to make sense of the post-Middle Woodland (or just non-Middle Woodland?) ceramic complexes in the Pomme de Terre Reservoir by defining several taxonomic units to account for the variability. The Lindley Focus was defined from Component

D at Blackwell Cave, together with several open sites in the Pomme de Terre Reservoir. It is characterized by limestone-tempered pottery and a variety of point forms, including Gary, Langtry, Rice Side-Notched, corner-notched forms, and a variety of small notched and unnotched forms. He grouped this focus, along with the Fristoe Burial Complex, with the Highland Aspect. Later, however, he decided to regard the Fristoe Burial Complex as an independent unit, since no more data were available on the Lindley Focus (Wood 1967: 105). Indeed, the name Lindley Focus seems to have dropped from sight in the Woodland literature of the area, largely at Wood's insistence.

Following the Lindley Focus in Wood's 1961 scheme was the Nemo Complex, based on Blackwell Component E. Shell-tempered pottery, both smoothed and cord-roughened, small notched and unnotched points, and Rice Side-Notched points, were assigned as markers of this complex (Wood 1961: 96). Like its putative predecessor, this name too has dropped from the literature.

What remains, therefore, is a series of seemingly generalized Woodland occupations of the Ozark Highland. The relationships between them have yet to be clarified. The final occupation of Rodgers Shelter (C/t.s.u. 1 and upper 2, both in the uppermost part of Stratum 4) is one such occupation. Recognized by a variety of point forms and ceramics, the occupation is interpreted as a "transient settlement station" for hunting of deer and turkey, and perhaps also fishing and mussel collecting (McMillan 1976: 226). No radiocarbon dates are available for this upper stratum, but McMillan (1976: 226) suggests a span of 1750 to 1000 B.P. for the Woodland.

Chomko accepts similar dates, around 1950 to 1000 B.P. for the also unradiometrically dated Woodland component at Phillips Spring (1976: 109). Small triangular notched and unnotched points, Langtry Points, and corner-notched points are all present in the Woodland strata there. Ceramics are limestone, grit- and hematite-tempered, but no clear ceramic sequence could be established for the different varieties.

Two radiocarbon dates are available for the Woodland levels at Saba Shelter: 1400 B.P. ± 100, and 2070 B.P. ± 100, neither of which were felt to be reliable (Vehik 1974: 39). Like the other Woodland components, that at Saba is recognized by a variety of point forms and ceramic varieties that essentially duplicate those reported in the above discussed components. Vehik (1974: 106) suggests a rough temporal ordering of limestone- and grog-tempered ceramics preceding shell-tempered – unfortunately a not very helpful suggestion.

Western Prairie Region

Late prehistoric developments in the Western Prairie Region are similar to those in the Ozark Highland, but add a few new details – especially toward the end of the sequence (or at least what we suppose to be the end of the sequence). A series of rock shelters on tributaries of the Osage River in St. Clair County produced the same varieties of points and ceramics. Similarly shelter excavations in Stockton Reservoir produced assemblages that "conform with the generalized Woodland pattern for this period" (McMillan 1968: 8). However, either because identifications are possible or regional variability is present, the sequence is different. A small, but nevertheless regular, amount of Caddoan pottery occurs. Sand Bluff Shelter produced several sherds identified as Caddoan (McMillan 1966), while the Eureka Mound contained a Spiro Engraved water bottle (Wood and Pangborn 1968). Somewhat more Mississippian material appears. There is shell-tempered pottery in a number of shelters suggesting "an intermittent occupation of the area by Mississippian peoples postdating the Woodland occupation, or part of a terminal Woodland culture which had adopted Mississippian elements" (McMillan 1968: 9). Wood's (1968) analysis of ceramics and faunal remains from Vista Shelter also suggests a Mississippian hunting and butchering site related to the Steed-Kisker Focus in the Kansas City area.

In sum, the evidence for ceramic complexes in the Western Prairie Region suggests that the same general (Late?) Woodland occupation occurred there as is present in the Ozark Highland. Several late prehistoric occupations, however — notably Caddoan and Steed-Kisker and/or other Mississippian complexes from the Plains border are also present. McMillan (1968: 6) has suggested the following ceramic sequence for shelters in the Stockton Reservoir: (1) decorated clay-tempered=Middle Woodland; (2) clay-, clay-grog-, grit-, and sand-tempered=Late Woodland; (3) fine grit- and bone-tempered=Caddoan; (4) limestone- and shell-tempered=Late Woodland; and (5) shell-tempered=Mississippian. No further work has been done in the region to support or modify this sequence.

Turning to open sites, we learn little more about the Woodland occupation of the Western Prairie. Two non-pottery sites, Flycatcher and Dryocopus, both produced multiple remains of structures. House 3 at Flycatcher yielded a date of 1235 ± 95 B.P. (A.D. 715 ± 95), somewhat earlier than the A.D. 1000 date expected (Pangborn, Ward, and Wood 1967: 21). Another Flycatcher site date of 560 ± 100 B.P. (M-1899) = A.D. 1390 ± 100, and a Dryocopus site date of 465 ± 100 B.P. (M-2024 and M-2025 combined) = A.D. 1485 ± 100 are consistent with one another but seem to be too late (Calabrese, Pangborn and Young 1969: 39).

The Woodland period and the late prehistoric occupations in general are thus poorly known. Few radiocarbon dates are available, and they are ambiguous, and the ceramic sequence is suggested but not well refined. Evaluating the literature suggests that the settlement system is comprised of small terrace edge "villages" – "hamlets" might be a better term – with ancillary hunting camps both as open sites and in shelters. The area also seems to have been hunting territory for late prehistoric villagers from the Central Plains edge – particularly Caddoan and Steed-Kisker – without supporting a complete settlement system for either of these groups.

Research Questions

Many questions are thus raised for study. Can we establish a tighter ceramic and point sequence? Is the regional variation suggested reasonable, or is it merely a result of sampling accident? Is the Plains-like occupation confined to the Western Prairie Region? Is it a special purpose occupation? What is the settlement system of the generalized Woodland occupation? Is the fact that so far we have seen small villages only in the Sac River drainage a result of sampling accident? Or is there a regional differentiation in land use in which habitation occurs in the prairie area with hunting in the more heavily wooded areas? Or are habitation sites in wider alluvial bottoms with other camps elsewhere? Were the generalized Woodland peoples still present in the area when the possibly specialized use of the Western Prairie was being made by Caddoan and Steed-Kisker groups, or was the area a vacant "no-man's land" or hunting territory? In other words, does the Western Prairie change function? If so, can we tell why? Does it diverge from cultural developments (or lack thereof) in the Ozark Highland region?

Comments on the Chronology

The preceding synopsis of the archeology of the Truman Reservoir prior to the inception of the current program highlights a number of problem areas which should be rectified in the current program. The most obvious need is for a research design to integrate the work. Except for investigations at Rodgers Shelter, there has been no integrated research design for the area. Most investigations have been independent of one another and have led to descriptive reports. The comparative material in these reports is mostly presence-absence comparison of specific styles of artifacts from sites in Truman and immediately adjacent reservoirs. Little attempt has been made to make comparisons with sites in other river drainages or other sites. Thus, portions of the chronology are vaguely known, and confused. The present culture-historical knowledge of the central Osage River basin is heavily particularistic. We know that certain ceramic and point styles occur at particular sites, and one can normally find out at what other nearby sites they occur, but there has been little critical synthesis of the knowledge, and little effort to determine substantive problem areas. Wood (1961) attempted it for the Pomme de Terre Reservoir nearly two decades ago.

That it is now outdated is a tribute to on-going research; that it has not been updated is a pity.

The lack of overall research design has also fostered a lack of comparability of categories of artifacts and other classes of cultural remains that might otherwise be directly compared to form a general model of the settlement systems in the reservoir vicinity. If such data were available, it would have been desirable to use it to try to extend the culture/environmental model derived for Rodgers Shelter (Wood and McMillan 1976) to include other sites. Thus, the present research could have begun with a broader and more refined settlement/subsistence model from which to work.

The questions asked above are therefore, simple and basic questions. All of them cannot be answered from survey data alone, of course. However, they are posed as general research questions for the entire archeology program in the Truman Reservoir vicinity. Some may be answered with survey data, some only with a combination of survey and excavated data, and some probably cannot be broached until the mitigation stage of investigations. Still, all are posed at the beginning in order to direct the investigations and provide a basic orientation to the whole research effort.

Further, these are by no means all the research questions that can be asked. They are merely the most obvious, and the ones most directly and immediately following from the general kinds of research questions enumerated in Chapter I. As the project unfolded, new questions were certainly asked, as new identifications of point styles were made, and as new observations on the survey data were made, and reanalysis of old collections was carried out. Some of these questions were engendered by responses to some of the questions asked above, some a response to our growing familiarity with the reservoir area. The above questions were, therefore, the starting point in 1975.

CHAPTER III

SETTLEMENT

Settlement Patterns

A dominant theme in American archeology for nearly a quarter of a century has been the study of settlement patterns. Although it is not the intention here to review the development of this concept (see Parsons 1972 for a review), the first major expression was that by Gordon Willey (1953) in his monumental study, Prehistoric Settlement Patterns in the Viru Valley, Peru. In the introduction to this study, Willey (1953: 1) defined the concept:

> The term "settlement patterns" is defined here as the way in which man disposed himself over the landscape on which he lived. It refers to dwellings, to their arrangement, and to the nature and disposition of other buildings pertaining to community life.

As used, therefore, the settlement pattern concept has been largely descriptive. For example, Johnson (1974: 118) has described the settlement patterns of Hopewell sites in the Brush Creek valley near Kansas City: "occupation sites are spread along the length of Brush Creek, . . ., the sites are concentrated at lower elevations from 765 to 850 feet, . . . the floor of Brush Creek valley and terrace remnants were favored topographic settings," etc. These descriptive regularities comprise the analysis of settlement patterns.

Like any description, however, the description of settlement patterns could potentially draw on any number of variables, some of which would be relevant, and many of which would be irrelevant. As with description of any class of archeological remains – be it ceramics, chipped stone, or whatever – descriptions of site locations select a number of variables thought to have had cultural significance and relate sites to these variables. In the present study, we relate prehistoric sites in the Truman Reservoir to three major classes of variables: hydrographic, topographic, and vegetational.

HYDROGRAPHY

It will be of interest, and of some importance, to relate site locations to a number of hydrographic variables. We will include among these: (1) distance (horizontal) to water, (2) the rank of the stream along which the site is located, (3) the side of the drainage on which a site is located, and (4) the relation of the site to one of the major streams in the area – especially the Osage or South Grand River.

Water is always a critical variable in site location, particularly the availability of an adequate supply of fresh water. This is not necessarily so obvious in the Midwestern United States where it seems one is never far from water, but it becomes more apparent when we examine accounts of groups in arid environments. For example, in speaking of the !Kung Bushmen of the Kalahari Desert in southern Africa, Richard B. Lee (1969: 56) notes that:

> the distribution of water sources is by far the most important ecological determinant of Bushmen subsistence. The availability of plant foods is of secondary importance and the numbers and

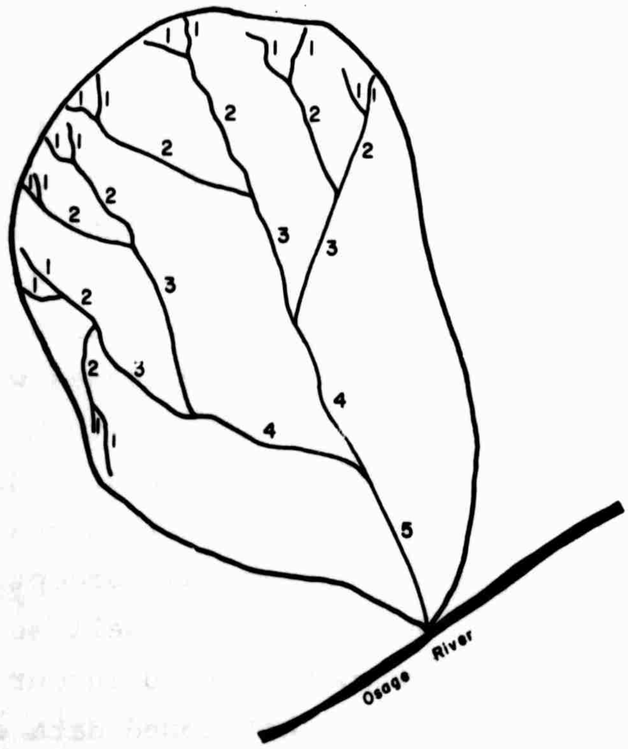
distribution of game animals are only of minor importance.

The research design for the Southwestern Anthropological Research Group (SARG) calls for an examination of the horizontal distance to water (Plog and Hill 1971: 25), asking the question: "Is the nearest water source to the sites the same or different from the distribution of nearest water sources for an equal number of randomly located points?" So far, SARG has produced very few research results, but a study by Green (1974) in southeastern Utah suggests that the importance of the distance to water variable varies over time, and that water is not always the critical variable we sometimes think it to be. Conversely, a study of Woodland sites in the Sangamon River drainage of central Illinois concluded that the "horizontal distance to water" variable did very little for the analysis, not because it was unimportant, but because it was so important that its value was nearly a constant (Roper 1975a: 279). For the present research, we hypothesize that a frequency distribution of horizontal distance to water will show a curve very badly skewed to the left and highly leptokurtic. Further, we predict that this distribution will show little variation over time and space.

We also examine the rank of the closest watersource. Although any size body of water may suffice as a source of daily subsistence needs for water, not all bodies of water will be alike for other purposes, such as fishing, mussel collecting, or as avenues for transportation and communication. Large navigable streams with a high diversity of species, and small non-navigable (perhaps intermittent) streams with a low biomass simply cannot be equated except as a possible source of water. To describe differences among sites, we use the stream ranking system outlined by Strahler (1964; see also Leopold 1974: 63-67; Weide & Weide 1973). In this system, a stream with no tributaries is designated as a stream of the first order. When two first order streams join, a second order stream is created; when two second order streams join, a third order stream is created, etc. (Fig. 6a). Note, however, then when streams of unequal rank join, the lower order stream is considered to terminate and flow into the higher order stream – which retains its rank; only when two streams of equal rank join is a stream of a higher order created.

However, not all first order streams are exactly alike. Consider (1) a site on a first order stream that has no tributaries and has nothing joining it before it flows into a river such as the Osage (Fig. 6b), and (2) a site on a first order stream that joins another first order stream to become a second order stream which joins another second order stream, etc. until eventually a fifth order stream is created (Fig. 6a). In both cases the sites are on first order streams, but these situations are clearly not the same either. In this study, therefore, we examine not only the rank of the stream the site is on, but the rank of the stream this stream flows into, and the number of stream junctions (regardless of rank) one would pass if they were to go upstream from the river (Osage or South Grand).

The side of stream variable has not been frequently studied. Its value, however, has recently been demonstrated by Flannery (1976) in a study of Formative period villages in Mesoamerica. In this, he asks the question (1976: 173): "Why are Formative villages located on a particular <u>side</u> of the river, for example, on the left



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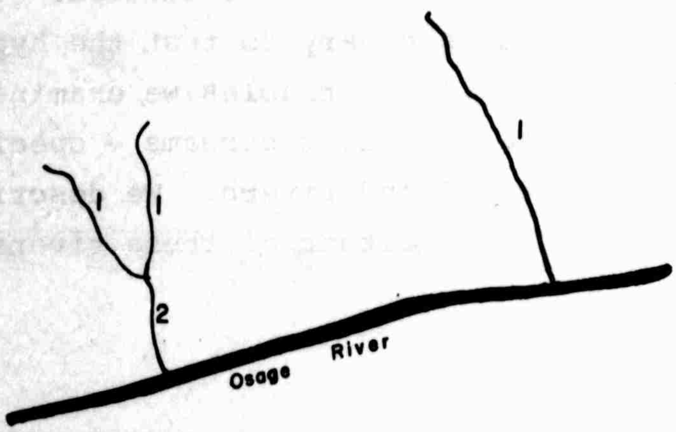

b

Figure 6. Stream Ranking.

bank rather than the right bank?" He then draws on a study of historical geography by Burghardt (1959), who examined river bank placement of towns in the Mississippi, Missouri, and Ohio river systems in the United States. Burghardt's analysis suggests that chosen river side may depend on the location of its more distant sustaining hinterland (Flannery 1976: 174). Flannery's (1976: 180) own analysis of Formative Mesoamerican villages concludes that: "Other factors being equal, villages will locate on that side of the river which affords them the best catchment area . . ." We will defer a discussion of catchments until the next section of this chapter, and at this point merely note that we will accept Flannery's conclusion (drawn from Burghardt's as well as his own analyses) as a hypothesis to be tested in our own research. In the present study, we have not coded data on side of drainage, but we have measured the amount of area within one mile of the site, and on the same side of the river. This measurement can easily be converted to a percent, and percentage distributions can be studied. In fact, this latter figure is necessary to test the hypothesis.

The last hydrological variables we examine are the relations of sites to the major streams – specifically the Osage or the South Grand rivers. We describe sites by stream distances from either of these rivers.

TOPOGRAPHY

Topographic variables are also frequently used in describing settlement patterns. In the present study, we describe sites by: (1) elevation above the river, (2) exposure, and (3) their relation to uplands and bottomlands.

All sites are obviously located on landforms, and also near other landforms. In fact, gross topographic divisions are frequently used to describe the distribution of sites. This is not entirely meaningful, however. For example, consider a site described as located on a terrace (Fig. 7), and suppose the terrace to be relatively broad. Is it reasonable to describe sites at the front edge of the terrace, just above the floodplain (Site B, Fig. 7), and those at the back edge of the terrace, snuggled against the base of the bluffs (Site A, Fig. 7), as simply "on the terrace"? Is it reasonable to gloss over the other locational information contained within these two gross categories? Similarly, is it reasonable to describe sites at the front edge of a terrace and those at the back edge of a floodplain as somehow different simply because they are on different landforms? Is it reasonable to split the two sites that are actually almost identically located? We think not, and provide two examples to illustrate the point.

The first example is from an analysis of Woodland sites in the Sangamon River valley of central Illinois.

> It must be emphasized that the models and conclusions arrived at in this study are based on a consideration of characteristics of a settlement's situation rather than of its site alone. We can very dramatically demonstrate the utility of this concept by comparing evaluations of different types of Middle Woodland sites, for example, on landforms, and in their topographic situation. Were we to evaluate the null hypothesis that different types of sites . . . were not on different landforms, we would, in fact, not reject

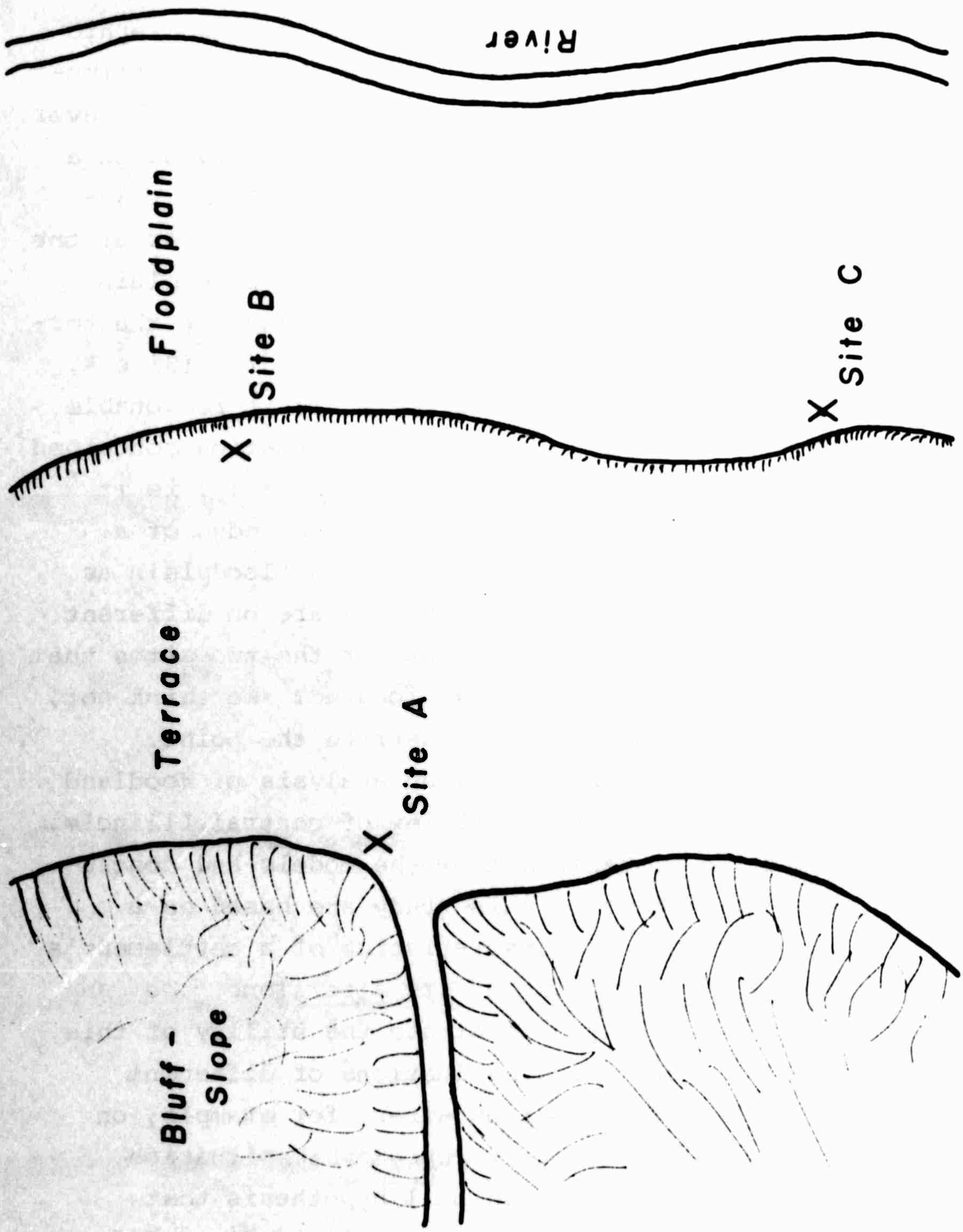

Figure 7. Relations of Sites to Topography.

> the null hypothesis ($X^2 = 4.52$, DF = 3, $p>.2$). Yet, as we have shown . . ., these two types of sites do differ very greatly when we consider their total situation. Take slope for example. Twelve of the 63 Middle Woodland sites evaluated in this study are listed as being on the slope. Seven of these twelve are ceramic sites of one type or another, the other five are projectile point sites. The near evenness of the split glosses over the fact that most of the ceramic sites are near the base of the slope, while most of the projectile point sites are nearer to bluff-crest in far different situations. It further betrays the fact that ceramic sites at the back edge of a terrace are in virtually identical situations to those low on the slopes. The artificial division of landforms into floodplain, terrace, valley slope, and uplands is simply too gross to pick out locational variation within the Middle Woodland settlement pattern and to be predictive of location of different types of sites. Yet it is exactly this gross sort of division that is typically employed in a stratified research design which has as its goal the reconstruction of prehistoric settlement patterns (Roper 1975a: 289-290).

A possibly even more dramatic demonstration comes from an analysis of sites recorded during a survey of part of the Sac River just downstream from the Stockton Dam. Survey was done exclusively in river bottoms, yet an analysis of these sites in relation to other landforms (as well as to the river) found some highly interesting and explainable patterns of locational variation in sites spanning perhaps ten millennia (Roper 1977: 81-96). Had sites been recorded merely as in bottoms, locational patterns could never have been identified.

In the present study (as with the Downstream Stockton analysis just cited) the area of land of various landforms found with a given distance from the site will be evaluated.

Evaluation of elevation above the river could be another means of examining the landforms and positions of sites relative to topography. It may also reflect other factors of site selection, such as a view or protection from floods. For example, both Judge (1973: 311) and Loendorf (1970: 26) found that view was an important factor in site location in New Mexico and Montana, respectively. Christenson, Klippel and Weedman (1975: 47) plotted the distribution of sites recorded during a bottomland survey at given elevations above the Sangamon River and in relation to flood probabilities, and found that most sites were above the level at which the annual flood is expected.

Exposure refers to the direction a site faces and obviously can have a high degree of correlation with the relative amount of protection provided a site from the elements.

In this analysis, the eight cardinal and sub-cardinal directions are used to describe the exposure of sites.

VEGETATION

The distribution of plant communities is probably one of the most important variables in site location. In fact, both floral and faunal communities are probably important, but the prehistoric availability of fauna is is rather difficult if not impossible to assess in the same way as floral resources. Since, however, faunal communities are highly correlated with the distribution of plant communities, examination of site locations in relation to plant communities alone should serve as a reasonably accurate assessment of the availability of all classes of biotic resources.

As with topography, however, it is argued that a simple determination of the zone a site is in will not be adequate, since it too fails to account for the relationship of the site to the several nearby zones. Rather, the areas of various resource zones within a given radius of the site will be evaluated. The reasons for this strategy are outlined in a later section of this chapter.

The above described variables will readily serve to introduce a certain amount of descriptive orderliness into the massive site data certain to result from the survey of a region the size and archeological potential of the Truman Reservoir. It will not, however, serve to explain this observed order, nor to provide complete answers to the research questions outlined in Chapter I. For these purposes, additional methods, models, and concepts will need to be employed.

Settlement Systems

The reorientation of archeological theory that occurred in the 1960's introduced a new and somewhat more dynamic concept — that of the settlement <u>system</u>. In contrast to the settlement <u>pattern</u>, defined above as the description of regularities in the distribution of sites in relation to various features of the biophysical environment, the settlement system is concerned with the functional relationships of sites to one another and the dynamics of their interrelationships with their environments (cf. Winters 1969: 110).

The analysis of a system requires specifying a number of things, including the structure of the system – i.e., its elements and the interrelations among them – and the relations of the system with its environment (cf. Harvey 1969: 451-455). This type of analysis is best exemplified by Winters (1969), but the basic theory is well expressed by Struever (1968: 135):

> The analysis of kind, number, and distribution of material elements recovered from an archaeological site, therefore, enables the archaeologist to define tool kits, activity sets, and hopefully, activity areas. These are the building blocks upon which settlement types are defined. Sites in which a particular configuration of exploitative and maintenance activities were carried out will disclose a similar structure of material elements; all such sites are representative of a single settlement type.

In the latter, that is, the specification of the relations of the system with its natural environment, Roper's (n.d.) site catchment model is used. It is assumed that: (1) the prehistoric communities being analyzed were either hunter-gatherers or primitive horticulturists (in fact the model may be useful for more complex societies, but it has not yet been tested in such cases), (2) man-land relationships are more important than man-man relationships in specifying the locations of sites and explaining their functional differentiation in such societies.

The settlement system definitely has a spatial component, i.e., the use of space is ordered by the community. One goal of the Truman project is to understand and model the spatial organization of the prehistoric settlement systems in the central Osage River basin and to understand certain basic principles of spatial organization of hunter-gatherer and primitive horticultural societies in general.

A concept basic to this research is that of the catchment - i.e., the area from which the contents of a site have been derived (Higgs 1975: ix). Human communities interact with and extract energy from the territory surrounding the places they inhabit. It would be expected that quantities of desired resources closest to a site should be taken first and that resource acquisition should decrease as a function of distance. It would also be expected that some depletion of resources should occur, necessitating dispersal farther and farther afield in order to procure sufficient quantities of the resources desired. The amount of energy that can be expended on procurement is ultimately finite, however; therefore, the distance that can be traveled from a single locus to obtain resources is also finite. Yet, over time, energy expended relative to energy procured will rise - a situation clearly tolerable only up to a point. At this point, something must happen and energy expenditure must be set back to a minimum. Several strategies may be employed to obtain such a solution: (1) the site can be moved, (2) attention can be shifted to another set of resources - either by cultural selection of a different set of resources, or by the natural seasonal cycle, or (3) part of the group inhabiting the site may temporarily move to another camp. In fact, the course of action followed may well relate to how much energy must be expended in pursuing the various possibilities, and may well also relate to the structure of the natural environmental setting.

It is obvious that the solution adopted, plus the frequency with which people move (be it partial, or whole, permanent or temporary) will have profound archeological implications. These implications will extend to both the configurations of exploitative and maintenance activities and artifacts within sites, and the distribution of sites and the characteristics of the places in which the sites are found. For example, it would be expected that the archeological remains of a community which frequently changed its location would include a series of small, seasonally occupied camps, each with a full range of exploitative and maintenance activities represented, spread out over the landscape in environmentally diverse settings. On the other hand, in the case of a semi-permanent or permanent community, one would expect to find remains of a full range of exploitative and maintenance activities, a relatively large amount of debris, and probably equivalent environmental settings. To these latter may be attached a series of small, sparse, "limited-activity" or special purpose camps — probably in settings environmentally complementary to that of the main camp.

In spite of assertions about settlement systems in the previous paragraphs, however, complete specification of the elements of the settlement system on the basis of survey data alone is impossible. Delineating tool kits, activity sets, activity areas, and ultimately, site types requires examination of intra-site spatial associations of archeological remains. Examining such spatial associations from surface evidence alone is probably a rather dubious technique, at least in the Midwest, for it would seem to assume: (1) a reasonably undisturbed ground surface; (2) knowledge of congruence between surface and subsurface distributions; and (3) the presence of only one component at the site. Although constant plowing and disking of fields may not necessarily disturb relations as badly as is sometimes supposed (Roper 1976c: 374), in fact the hypothesis of surface-subsurface isomorphism of debris has to be evaluated anew for each site investigated. Further, settlement system reconstruction is based on investigations at a number of sites and is most meaningful when based on sites investigated using identical techniques. Sites surveyed under varying ground cover conditions cannot be said to be investigated using comparable techniques. The comparability of the collections cannot be evaluated until such time as excavated collections are available. The presence of more than one component at a site serves to add an element of complete indeterminacy to the assignment of individual specimens to an occupation, and to render many spatial relationships on the surface as totally uninterpretable (Downer, 1977).

Survey collections are not totally hopeless, however. From them one may derive: (1) an analytical framework for analysis of future material, one of the survey analysis operations specified in Chapter I; (2) a good idea of the kinds of remains to be encountered; (3) a <u>general</u> impression of the types of sites present, and (4) preliminary chronological data for the sites recorded. All of these are of potential importance in designing detailed investigations into the structure of a prehistoric settlement system.

Additionally, however, we derive from the survey the locations of the sites that comprise the settlement system. Analysis of these locations, another of the analytical operations specified in Chapter I, is, however, highly possible on the basis of survey data and is in fact one of the chief contributions of the survey to settlement system analysis. It is this operation of settlement system research that is stressed in this report.

The site catchment model, briefly outlined above, has operational implications for the analysis of site locations. Since movement at too great a distance from a site will soon become uneconomical, it is reasonable to assume that most procurement, especially of the most critical resources, will occur within a short distance of the site. Less critical and/or highly mobile resources may require greater distances to be traveled. It is expected that procuring all these resources from a single locus would occur relatively near the site or else be carried out from an ancillary camp or camps. If this is so, then sites could be expected near the resources on which they will most heavily draw. The quantity and diversity of those resource zones will, in large part, be related to the spacing of the zones on the landscape and the type of site. In general, it is expected that:

1. Habitation sites will seek to maximize the diversity of resources within an economic distance of the site, whereas limited-activity sites will seek to maximize quantities of single resources.

2. Functionally similar sites will be found in similar settings, at least as regards the availability of critical resources.

Although these propositions cannot be tested directly from survey data, it is possible to use them to interpret survey data (i.e., site location data) to derive predictions for the kinds of settlement types expected at the locational types. That is, the site location data may be analyzed to derive a set of location types and later compared with site types. The location types may then be used to select sites to be more thoroughly investigated, while the general propositions about location of sites may be used, in concert with what is known about settlement systems in the central Osage River basin, to make predictions about the settlement types. To derive location types, therefore, requires examination of the resource zones within a given distance of a site. The specifics of this analysis are given in Chapter VII.

Finally, change, both over time and across space, is to be examined. The cultural-environmental model constructed for the lower Pomme de Terre Valley specifies several periods of major environmental change during its nearly 12,000 years of human habitation. Generally, the model posits a deciduous forest cover during the early millennia of the Holocene. Prairie expansion, however, began around 8500 years ago, but had contracted by around 3000 years ago (McMillan and Wood 1976: 240). These are broad trends, but smaller climatic fluctuations probably also occurred (Bryson, Baerreis, and Wendland 1970). How then does a human community respond to such changes? What are the implications for the settlement pattern and settlement system?

Change occurs not only over time but also over space. A basic premise of the present research is that certain principles of change are as valid across continuous space as through time. For example, it is predicted that as quantities of highly sought after resources are reduced, a shift would occur in the subsistence system, which may well have implications for the settlement system. Reduction in quantities of resources may, however, occur via one of several mechanisms: (1) reduction over time, perhaps in response to a climatic change, (2) reduction across space – e.g., a reduction in forest as one moves from east to west in the reservoir, or (3) an increase in population, which in effect reduces the amount of resources per capita.

In the present examination of spatial change, the model for the lower Pomme de Terre Valley is used as a starting point, and changes are observed as parts of the model are slowly disturbed. For example, settlement distributions along streams of both greater and smaller magnitude than the Pomme de Terre (but in otherwise similar settings) may be examined; and distributions along streams of similar magnitude (e.g., the Sac River) but of varying topographic and vegetation distributions, etc. may be examined. The end result is therefore expected to be a cultural-environmental model useful over a broader portion of the central Osage River basin. Coupled with this, hopefully, is a single empirical example helping to support or refute general theoretical propositions about the interactions between a human community and its biophysical environment.

CHAPTER IV

THE TRUMAN RESERVOIR ARCHEOLOGICAL SURVEY

Archeological survey in the Harry S. Truman Reservoir was carried out in two stages. The first stage lasted from 16 June to 30 November 1975 and included an extensive traditional reconnaissance throughout the reservoir, plus a survey of borrow areas and relocations. These latter areas were high priority items, and the survey of these areas was reported as Part II of a report for Purchase Order DACW41-75-M-1854 (Roper 1975c: 21-45). The second stage of the survey was carried out from 1 March to 15 December 1976, and concentrated on an intensive survey of portions of the reservoir — the surveyed portions being selected via a stratified random sampling design.

Records Check

Before the survey was begun, copies of records were obtained for all sites on file in the Archaeological Survey of Missouri (ASM). These sites had been reported by previous surveys, local residents, or by interested amateur archeologists in Bates, Benton, Cedar, Henry, Hickory, St. Clair, and Vernon counties. Those sites in areas to be affected by the reservoir were identified and plotted on maps. A total of 350 sites were identified in the seven county area, some of them well outside the limits of land to be acquired by the Corps of Engineers. These sites were tabulated, together with information on their type (open, shelter, mound, bog); whether or not it had been excavated; the date it was recorded; the name of the recorder; and reports (if any); and were plotted on a map drawn at the scale of 1:1200. These data were submitted to the Corps of Engineers as Part I of the report for Purchase Order DACW41-75-M-1854 (Roper 1975b: 1-20). Copies of the survey forms, plus listings of sites within each county, arranged by legal locations, and maps compiled from ASM and/or previous Truman survey records, were used to help identify already recorded sites.

The major problem with these records is that while they record places where sites were found, they do not list those places which were surveyed but where sites were not found. That is, there are at least two possible interpretations for all blank areas on a site map: (1) the ground was walked, but no sites were observed, or (2) the ground has never been walked during an archeological survey. Inasmuch as these two situations are impossible to identify, given the nature of existing records, it was recommended (Roper 1975b: 7) that: "the entire reservoir be surveyed with care taken to identify already recorded sites." The present survey followed this recommendation.

Fieldwork Procedures: Stage I

Survey teams were normally composed of two persons — one a supervisor, one a crew member. The supervisors were normally persons with either a masters degree in anthropology or a nearly completed masters degree (in several cases they were doctoral candidates), plus experience in archeological survey. Most crew members had at least the bachelors degree and, while all had had some field experience, generally they had little or no survey experience prior to working on the Truman project. The number of crews actually engaged in survey varied from two to five, depending on season.

Responsibilities of the supervisor included selecting the areas for the day's work, in coordination with other supervisors and the field director; completing all survey records, maps, and photographs; and guiding the field efforts of the crew. Maintenance of any equipment used, including vehicles, was also a supervisor's responsibility. The primary responsibility of the crew member was to work with the supervisor – walking fields, gathering information to be recorded on site forms (and sometimes filling them out – although it was the supervisor who was held responsible for accuracy), and assisting in processing materials collected.

In the field, the crew normally lined up at intervals of about 20 to 25 m and walked back and forth across the area to be surveyed, looking for artifacts, debris, or any other remains of past human behavior. Upon finding such remains, intervals were narrowed and a surface collection was made. The strategy for the surface collection varied, and surveyors were asked to record the strategy used. All materials collected were placed in a paper sack labeled with a field site number. Dimensions of the observed area of scatter (AOS) were determined by either pacing or estimation – preferably the former. A site form and sketch map were completed; a photograph – normally in black-and-white – was taken; and the site was plotted on field maps, generally U.S.G.S. 7.5 minute topographic maps and Corps of Engineers 1:12,000 topographic maps, as well as on aerial photographs.

RECORDING PROCEDURES

A standardized recording procedure was developed at the beginning of the survey. It underwent only minor adjustments during the first several weeks of survey. Thus, information recorded for each site is comparable for the entire survey. However, certain additional information, primarily mapped data, was recorded during the second stage of survey: this information is described below.

Blocks of site numbers for all affected counties were obtained from the Archaeological Survey of Missouri (ASM). Rather than sub-assign these numbers to individual survey crews (a procedure that inevitably leads to error), site numbers were assigned in the laboratory. Only a single person was to assign numbers. Initially, this was the field director; later, when a laboratory supervisor was hired, this person was in charge of assigning site numbers. In order to distinguish sites prior to assigning a permanent ASM number, therefore, each site was assigned a temporary field number when it was recorded. This number consisted of the crew supervisor's initials, the date, and the sequence number for that date. Thus, for example, 23BE211 was originally numbered AMJ-62075-4, meaning that it was the fourth site recorded by Ann M. Johnson and her crew on June 20, 1975.

For each site recorded, a "Harry S. Truman Archaeological Survey" form was completed. Normally, most of this form was to be completed in the field; in any event, the desideratum was for these forms to be completed and submitted on a daily basis. Alas, crew supervisors varied in their efficiency, and overall efficiency sometimes depended on other circumstances; but in general, the system worked well.

The form, reproduced here as Figure 8, is a variant of a form developed at the Illinois State Museum for use in the Sangamon River archeological survey, and is similar to the forms used by the Cannon Reservoir Archaeological Project and the Smithville Lake survey. The form features a check list mode of reporting, which not only guarantees inclusion of information on relevant topics (assuming, of course, the surveyor follows the instructions to completely fill out the form), but also standardizes the responses. It soon became apparent, however, that even this was not always sufficient to produce uniformity of response between surveyors. Therefore, a detailed set of written instructions was developed, giving definitions and meanings for each category. Discussions with survey crews also helped to more nearly standardize reporting. To be sure, subjective bias was not completely eliminated: the best that could be hoped for was to hold it to a minimum. We feel we were largely successful in this attempt, at least for most classes of information.

An additional form, completed each day, was the "Daily Survey Log," reproduced here as Figure 9. Past survey experience suggested that it was not always possible to be sure what areas had been surveyed. Even filling in areas on maps did not always provide the necessary check. Therefore, the reason for this form was to record, in a formal running commentary, where the survey team had been on a given day, approximately how much land had been covered, and what sites had been recorded. Although the form as developed and used was not a complete success in accounting for the land surveyed, it did serve as a useful approximation of survey progress and as a commentary on this progress, while the fact of a dated daily list of sites recorded served as

HARRY S. TRUMAN RESERVOIR ARCHAEOLOGICAL SURVEY

ASM No. ____________

Date ________________ Field No. ____________

Survey Leader ______________________________

Surveyor(s) ______________________________

Location _____¼ _____¼ _____¼ Sec ______ T ______ R ____________

County ____________________ Township ____________________

Quadrangle ______________________________ (15' 7.5')

Landmark:

Site is located ________ (distance) ________ (direction) from ____________ (landmark)

Elevation __________' to __________' MSL

Owner ______________________________

Address ______________________________

ENVIRONMENT

Landform: Floodplain Terrace Slope Dissected Upland Upland Plain

Microterrain ______________________________

Closest watersource: Stream name ____________________

Stream rank __________ Permanent Intermittent (U.S.G.S.)

Elevation of watersource: ________' to ________' MSL

Watersource is ____________m to ____________ (direction) of site

Site is on R L bank of stream (looking downstream)

Soil (field observations): Wet Dry

Color: black dark brown light brown yellow-brown yellow grey other ____________________

Texture: Sandy loamy clayey gravelly silty

Chert source nearby? Yes No

If yes, how far? __________m Primary Secondary

Site in: borrow area relocation public use area permanent pool 5-year flood pool other

Recommendations: resurvey testing excavation

If resurvey, why?

(1 July 1975)

Figure 8a. Survey Form.

ASM No. ____________

HST Res. Arch. Surv. p. 2

Field No. ____________

SITE CONDITIONS

Site in: Woods Pasture Cultivated Field Feedlot
Wasteland Other ____________

Ground cover: 0-10% 10-50% 50-90% 90-100%

If cultivated: fallow plowed and/or disked planted
Crop up: corn beans wheat other ____________
how tall? ____________

Rainfall: not significant light since worked moderate
heavy since worked

COLLECTION

Number of surveyors ________ Time spent collecting ________ hr.

Weather conditions: rain snow hail mud heat cold
overcast clear

Surveyor condition: ____________

Collection strategy: ____________

Materials collected: Points ____ Pottery ____ Bifaces ____
Scrapers ____ Drills ____ Cores ____ Debitage ____
Other chipped stone tools ____ Manos ____ Rock ____
Bone ____ Shell ____ Other ____________

Material observed but not collected ____________

Preliminary culture assessment: Paleo Dalton Middle Archaic
Late Archaic Woodland Mississippian
Historic Native American Historic Euro-American Unknown

Site type: Habitation Camp Mound Shelter Quarry
Workshop Unknown

Site size: AOS = ____________ m^2 partial total

How determined: Paced Eyeballed Taped

Depth (if known) ____________ How determined? ____________

Surface Features: Prehistoric ____________
Euro-American ____________

Is site previously recorded? Yes No Excavated? Yes No

Photographs B/W Color slides Color print
Roll # ____________ Neg. No(s). ____________

Remarks:

(1 July 1975)

Figure 8b. Survey Form.

HARRY S. TRUMAN RESERVOIR ARCHEOLOGICAL SURVEY

Daily Survey Log

Date ______________________

Survey Leader ____

Surveyors ____

Areas covered:

Location | Amt. of land (acres)

Sites recorded (list site nos.):

Architectural history sites recorded (list site nos.):

Remarks:

Figure 9. Daily Survey Log Form.

a highly valuable means of checking the completeness of survey records. For future research, it is strongly recommended that this type of form be retained, but that a better breakdown of the areas surveyed, weather and other conditions, the amount of land covered, etc., be developed. This could be supplemented by mapping procedures such as were developed during Stage II survey, and explained below, that accounted for some of the information we had hoped to record on this form.

Further recording included keeping separate photograph logs, turned in with each roll of film, and transferring site locations from field maps to laboratory copies of the same maps. Every effort was made to keep these records on a regular basis.

LABORATORY PROCEDURES

All material collected by the surveyors was first washed, rough sorted, and cataloged. "Rough sort" essentially separated artifacts from unmodified debris. Ground stone artifacts and ceramics, if any, were separated from the chipped stone tools that formed the overwhelming bulk of the collections.

The cataloging was designed to be stored in a computer file to be manipulated using the SELGEM program. At the time the survey was begun (mid-1975) the SELGEM system program had been acquired by the American Archaeology Division and, hopefully, was to become operational there before the end of the year. The decision was therefore made to design the cataloging format to be compatible with basic SELGEM record structure requirements, and to store the catalog data on on-line disk and tape, using the TSO (Time-Sharing Option) data entry and editing program with a teletype terminal, against the time SELGEM became operational and could be used to create and manipulate a master file. A number of advantages could result from use of such a system: (1) it was anticipated (correctly) that large amounts of simple catalog information would be accumulated, exclusive of analysis information to also be generated, (2) the contents of the file could be searched for different categories of material; for example, it would be possible to ask for all sites containing hematite, and such search could be carried out quickly and efficiently, (3) SELGEM records can readily have data added, deleted, or modified according to the needs of the researcher, and (4) it is not necessary to code information for all categories for each record – only the applicable information need be recorded.

The decision was also made to catalog individual artifacts rather than groups of artifacts, since it is possible to add information to SELGEM records. Since not all categories need be coded for all records, any analysis information for individual specimens can be added to the file. A further advantage of SELGEM is that specific data need not be coded for those specimens on which the specific observation is either not applicable or not made.

The basic cataloging format thus devised is shown in Figure 10, which reproduces an artifact catalog form with SELGEM categories added. Spaces 2-8 at the top of the form are for the serial number of the artifact; the transaction code entry is a SELGEM notation for what to do with the information; and the other numbers preceding each line are SELGEM category (first 3 digits) and line within category (last 2 digits) numbers. Only data recorded on the lines are entered – i.e., the category designations "state," "county," etc. are not entered.

Catalog Form

TRUMAN RESERVOIR SURVEY:
ARTIFACT CATALOG FORM

3
1̄ 2̄ 3̄ 4̄ 5̄ 6̄ 7̄ 8̄ 9̄ - Transaction code

00101	State	Missouri
00201	County	
01001	Site number	
01501	Site name	
02001	Provenience (E or S)	
02101	Provenience - horizontal	
02201	Provenience - vertical	
05001	Catalog #	
06001	Category	
06002	Comments	
15001	Raw material	
15002	Comments	
20001	Number of pieces	

Figure 10. Catalog Form.

In actual operation, therefore, each specimen was catalogued by marking it with a site number, "S" for surface or "E" for excavation, and a unique catalog number assigned in sequence for each site. The information was then recorded either on a form like that in Figure 10, or simply on a blank sheet of paper. The information was then entered onto an on-line disk using the TSO program on an IBM 2741 or DECWRITER terminal telephone - coupled to the University of Missouri IBM 370/168 computer.

A basic problem, still partially unsolved, was engendered over the definition of categories of artifacts to be used in cataloging. Analysis of chipped stone and other artifact categories was, of course, to be carried out as a part of the analysis of the survey material. The obvious end-product of that analysis would be a set of classes of artifacts. Unfortunately, in order to carry out that analysis, the material had first to be cataloged, but in order to catalog it a set of artifact classes was needed. Since we anticipated that the analysis would employ the activity-oriented artifact classification devised by Ahler and McMillan (1976), we tried to use the classes described in their paper. Problems with definition were immediately encountered, and it was clear that the system was generally unsatisfactory for our purposes. It was necessary to maintain a conceptual distinction between the <u>cataloging</u> of the collections and their <u>analysis</u>. The point of the cataloging procedure detailed above was the recognition of the need to maintain records of the contents of the collections, plus the need to be flexible enough to accommodate analysis-induced changes.

Fieldwork Procedures: Stage II

It was obvious that Stage I of the survey involved numerous problems that would detract from the ability to answer, or even partially answer, many of the research questions. These problems are of two kinds: (1) a sample of unknown bias, and (2) fieldwork problems.

Answers to certain of the level 1 and 2 questions require the estimation of certain population parameters for the sites; to do this it is necessary at least to know (if not eliminate) the bias in the sample.

In addition to the survey strategy introducing an unknown bias, a further, but also unknown bias was being introduced by the kinds of survey conditions found. The reservoir contains virtually all kinds of survey condition locally available – from cultivated fields, to pastures, and abandoned land – generally so thickly overgrown as to make it difficult to walk through, never mind see the ground – not to mention forested areas and steep rocky slopes. The visibility of archeological sites in the area varies greatly. Although the survey form takes note of the kinds of conditions under which a site was surveyed, such notation in itself is not a substitute for actually rethinking the ground cover problem – after all, a form was only filled out when a site was actually found, and the problem in many areas was to find a site in the first place. Evaluating negative evidence even within a sample survey is still difficult if some solution to the "archeological invisibility of sites" problem is not employed.

Considering these two interrelated sets of problems led tc the formulation of a revised survey strategy, designated as Stage II. This strategy formed the basis of the field work carried out from 1 March to 15 December 1976.

SURVEY DESIGN

The major emphasis of the survey design was to answer questions concerning differential use of the reservoir area over time and space. Specifically, emphasis was placed on the differential use of a locale over time, and differential use over space at a single time ("single time" being used in an archeological sense). The behaviorally realistic concept of human interaction with the natural environment cross-cutting zonal boundaries was also to be incorporated.

The best way to incorporate both these considerations, as well as provide a means of controlling bias, is to use a stratified random sampling design, with transects as survey units. Human adaptations are not to single resource zones but rather to a series of such zones. Because of distance and energy expenditure considerations, it is further proposed that spatially changing configurations of even the same resource zones may have drastic implications for the settlement patterns of a single culture (cf. Roper 1975a). In order to test this proposition, a series of "natural divisions" of the reservoir area was employed, each defined by a major stream or stream segment, and each characterized by the configuration of the stream and its attendant resource zones. Twenty-two such strata were defined within the reservoir area (Figure 11).

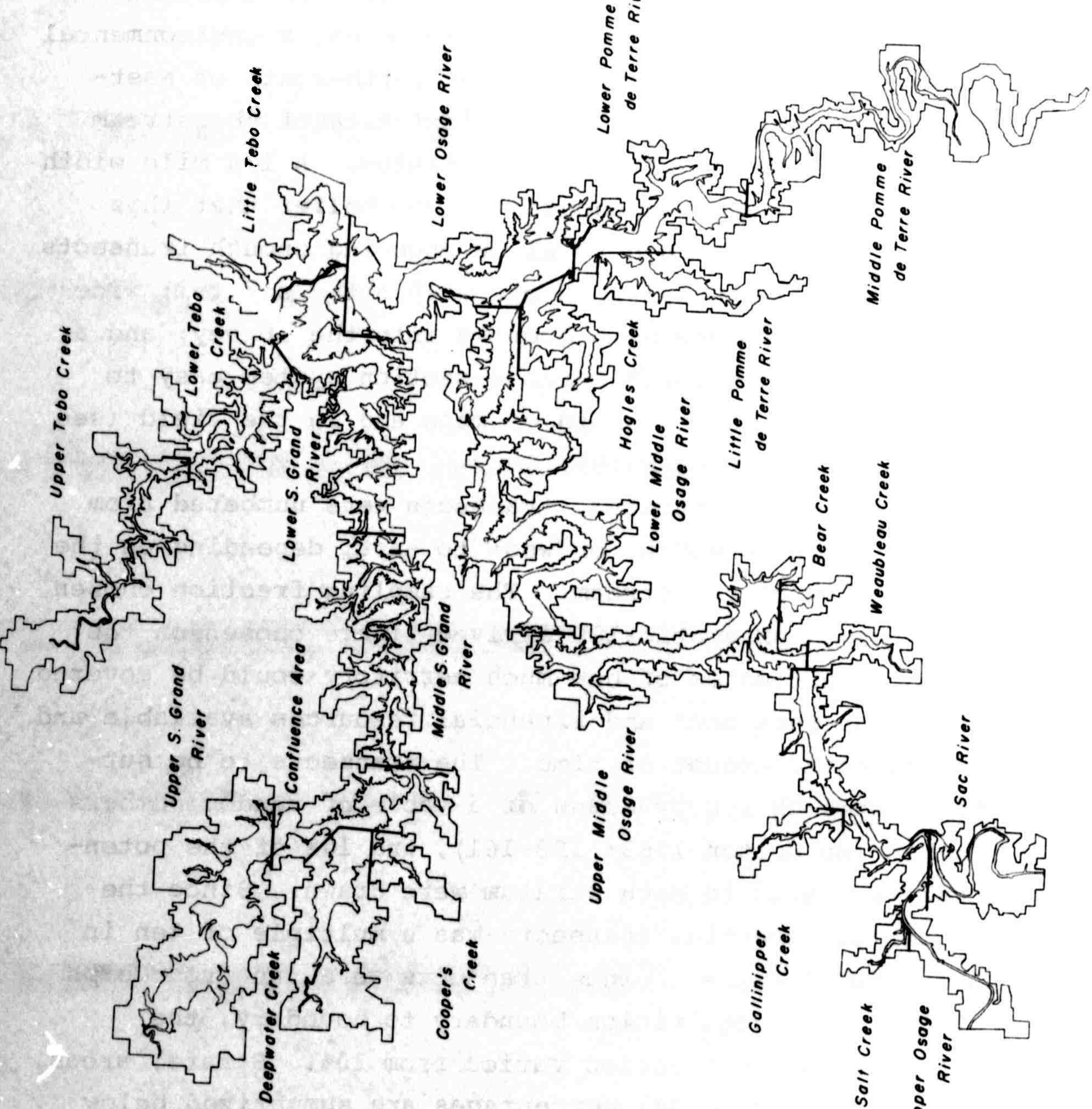

Figure 11. Survey Strata.

Within each stratum, transects were laid out running roughly perpendicular to the stream or stream segment defining the stratum and thus also to major environmental zones. Transects were run either north-south or east-west, depending on the major orientation of the stream or stream segment defining the stratum. A 1/8 mile width for each transect was chosen, on the belief that this would be narrow enough to allow choosing enough transects to provide good areal coverage within the stratum; wide enough to introduce some economy into the survey; and a division of the township-range-section system easy to delineate and follow, both on maps and in the field (see Figure 12 for an example).

Within each stratum, transects were numbered from either north to south, or west to east, depending on the orientation of the stream. The sampling fraction chosen was 10% — a pragmatically derived figure chosen on the basis of estimates of how much territory could be covered given the personnel and financial resources available and the allotted amount of time. The transects to be surveyed were chosen by means of a table of random numbers (Arkin and Colton 1963: 158-161), and 10% of the potential transects in each stratum were drawn. Since the number of potential transects was a multiple of ten in only two cases, and since transects were run from Corps of Engineers acquisition boundary to boundary, the actual sampling fraction varied from 10%. Strata, areas, transects, and actual percentages are summarized below (Table 2).

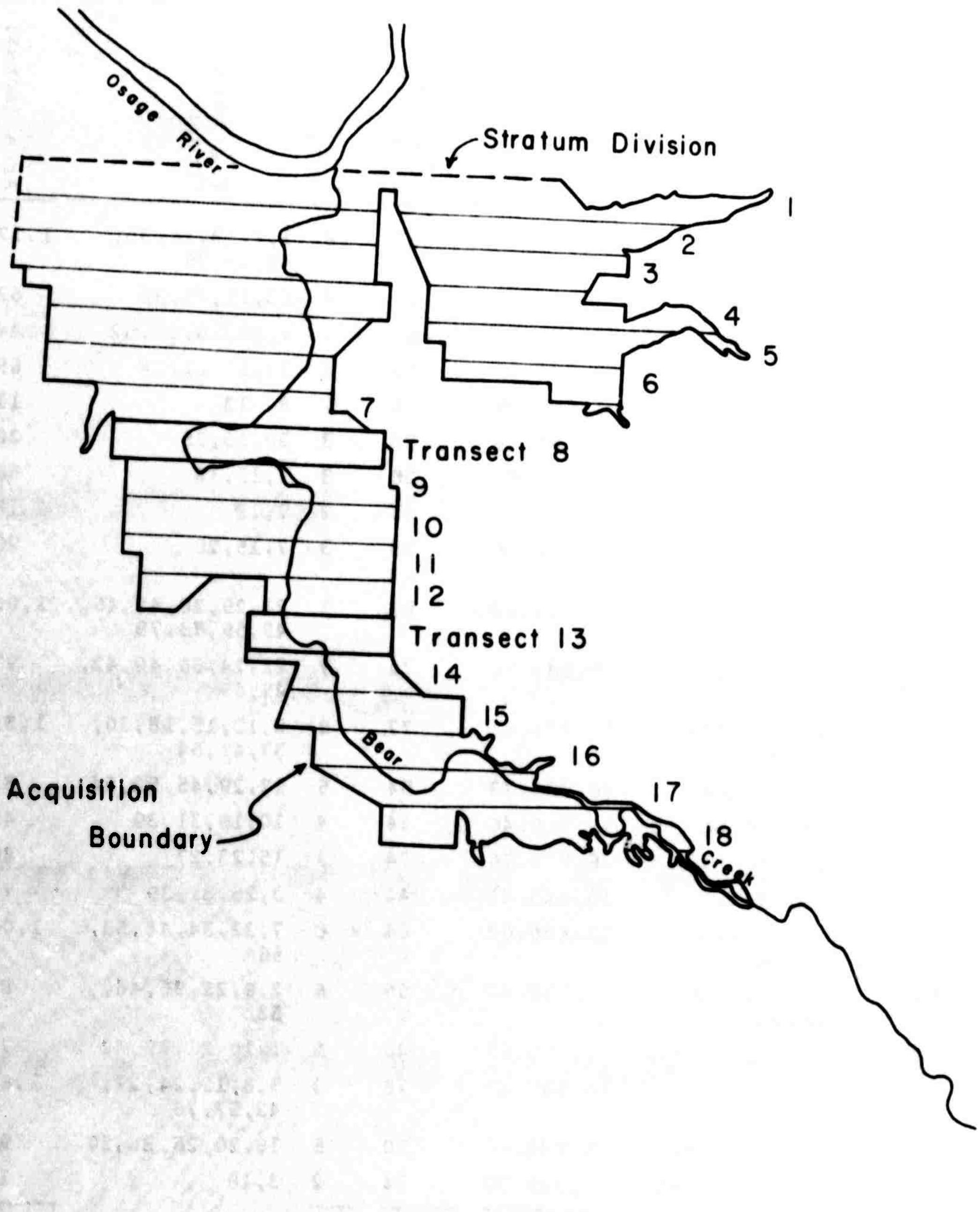

Figure 12. An Example of Transects in a Survey Stratum.

TABLE 2

Stratum and Transect Summary Stage II
Harry S. Truman Reservoir Archeological Survey

Stratum No.	Stratum Name	Area (acres)	# Potential Transects	# Transects Chosen	Transects Chosen	Area (acres) Within Chosen Transects	Percent of Area
I	Middle Pomme	9,498.32	83	8	1,7,13,14,35, 42,59,79	1,176.22	12.57
II	Lower Pomme	4,761.19	43	4	13,15,25,38	620.80	13.04
III	Little Pomme	4,172.13	53	5	6,12,28,42,52	444.16	10.65
IV	Hogles Creek	3,908.41	38	4	11,12,21,28	657.87	16.83
V	Bear Creek	1,566.96	18	2	8, 13	118.19	7.44
VI	Weaubleau Creek	2,087.26	28	3	20,23,25	283.38	13.58
VII	Sac River	4,752.55	28	3	1,15,18	565.91	11.80
VIII	Salt Creek	1,049.25	16	2	9,12	183.00	17.44
IX	Gallinipper Creek	1,582.76	25	3	7,15,20	200.76	12.64
X	Upper Osage	10,939.70	87	9	21,29,38,42,46, 49,59,73,79	1,068.80	9.70
XI	Upper Middle Osage	9,542.72	70	7	22,24,30,40,42, 45,49	970.24	10.17
XII	Lower Middle Osage	17,493.41	77	8	2,12,15,18,30, 37,49,54	1,526.40	8.73
XIII	Lower Osage	10,235.73	54	5	12,29,45,52,54	830.08	8.11
XIV	Little Tebo	5,765.46	44	4	10,16,31,39	457.40	7.93
XV	Lower Tebo	6,979.76	34	3	15,23,27	801.92	11.49
XVI	Upper Tebo	10,545.41	44	4	3,25,31,39	751.36	7.12
XVII	Lower South Grand	13,400.02	64	6	7,32,34,44,53, 56	1,018.88	7.60
XVIII	Middle South Grand	12,879.48	56	6	2,8,22,35,46, 53	846.08	6.57
XIX	Confluence Area	6,325.61	46	5	1,10,21,29,42	731.00	11.56
XX	Upper South Grand	16,580.41	78	8	5,8,13,24,27, 42,57,78	1,836.00	11.07
XXI	Deepwater Creek	8,835.95	50	5	18,20,26,36,50	935.68	10.59
XXII	Cooper's Creek	2,529.00	24	2	3,18	175.00	6.92
	Total	165,431.49	1,060	106		16,199.13	9.79

FIELDWORK IMPLEMENTATION

Survey strata were assigned, one at a time, to survey crews. Once the stratum was assigned and transects selected, the transects to be surveyed were drawn on field maps (COE topographic, COE real estate, U.S.G.S. topographic, and aerial photos). The order in which transects were surveyed was left to the discretion of the individual crews. The same basic walking strategy was retained as was used in Stage I survey, except that emphasis was placed on following transects, rather than covering whole fields, pastures, etc. Compasses were used to help stay within the transect.

The second problem to which the Stage II survey was to respond was that of ground cover. No good answers yet exist to counteract this problem, so it was necessary to rely on merely the best answers currently available. Therefore, shovel testing was employed to help "see" the surface in those areas in which the ground surface was obscured, and more detailed recording of conditions encountered was also done.

"Shovel testing" is a term recently coined by a group of Midwestern and Great Lakes area archeologists who regularly face the problem of how to survey in an area in which visibility of the surface is obstructed much of the time. It denotes the digging of small test holes, about the size of a shovel blade in width and depth, to effectively examine the soil below the obscuring ground cover and assess whether or not archeological remains are present. The exact strategy used in shovel testing, of course, varies from project to project depending on anticipated variability in site size, purpose of the shovel test, etc. (cf. Lovis 1976, Claassen and Spears 1975).

The normal spacing of surveyors was about 20-25 m, therefore, it seemed desirable to use a similar interval for shovel test holes. Ideally, one should use consistent observational strategies throughout a project, which would imply shovel testing throughout the entire area surveyed. Clearly this was out of the question for several reasons: (1) since a large portion of the area, including the area to be crossed by our transects, was in a condition where normal pedestrian techniques were feasible, it was unnecessary to shovel test simply in order to see the surface, and (2) time would simply not allow it. Experiments carried out at the beginning of March 1976 suggested that if shovel testing was to be carried out using the 20-25 m interval at the observed rate, the remaining nine months of survey would cover only slightly over 1% of the reservoir. Clearly, this would not be satisfactory.

We therefore employed what was loosely referred to as "discretionary shovel testing." That is, it was left to the discretion of the crew supervisor as to whether a particular parcel of land would be shovel tested or whether it would not. In general, shovel testing was not carried out in currently cultivated fields, closely cropped pastures (or pastures in which cattle were present — even backfilled shovel test holes could pose a hazard), or any other area where the ground surface was not so badly obscured as to preclude the observation of cultural debris. Shovel testing <u>was</u> generally employed in abandoned fields, heavily grown pastures, woods, and any other area where the soil surface was largely or totally obscured. Specific figures on shovel test recovery of sites and conditions under which shovel tested sites were recorded are presented in the next chapter.

ADDITIONAL RECORDING PROCEDURES

Recording procedures employed during Stage II survey were identical to those employed during Stage I, but with a few additions. Surveyors were asked to record whether or not shovel testing was employed and to keep careful records of ground cover conditions encountered along each transect. Maps drawn at the scale of 1:6000 for each transect surveyed recorded ground cover conditions, streams, fences, and similar features. Plotting of these maps was facilitated by the use of Corps of Engineer aerial photographs (1965 flight) acquired during the fall of 1975. Additionally, surveyors were asked to make very certain that the stratum and transect designations appeared on the survey form for each site recorded, and that if a site recorded was not inside the transect, that this also be clearly stated.

In the laboratory, procedures were also identical to those employed duri. j Stage I. Transect boundaries were plotted on both the Corps of Engineers topographic and real estate maps along with the site locations. All records for each stratum were kept together, instead of in numerical order as before, and artifact bags and the boxes containing these bags were clearly labeled as to stratum.

Reliability

Archaeologists have recently become aware of several kinds of bias influencing their reconstructions of past human behavior. Schiffer and Rathje (1973: 170) have labeled these n-transorms (non-cultural formation processes) which allows the archeologist "to explain and predict the interactions through time between a culturally deposited assemblage and the specific environmental conditions in which it was deposited." On the other hand, c-transforms (cultural formation processes) explain "the spatial, quantitative, and associational attributes of archeological materials as a function of the depositional behavior of the cultural system that produced them." Schiffer's (1976: 11-17) synthetic model of archeological inference places both types of transforms between observations on the archeological records, and inferences about human behavior. Collins (1975: 32), too, has discussed the problem of bias and notes that we must "be aware of the discontinuities that exist between the fact of patterned behavior and the surviving evidence of that behavior with which we must work." However, it would seem that one other set of transforms, or at least extenuating circumstances, stands between observations and inferences: the reliability of the observations themselves. This would seem to be particularly acute in a survey. The present study takes the position that several sets of factors may potentially affect the reliability of an archeological survey. These are discussed here, and will later be used to evaluate the Truman survey. Two purposes are to be served: (1) evaluate the Truman survey and present a reliability report as part of the report of findings, and (2) to attempt to generalize about factors that do and do not affect the reliability of an archeological survey.

Strangely enough, archeologists have given little attention to this matter of survey reliability — perhaps this is because it has been only recently that archeologists have realized that the survey itself is capable of providing data to develop and test hypotheses. Certainly, development of survey technique has been slow.

> An antiquarian observing a modern sophisticated, professional archeologist engaged in surface collection would be hard to convince that data recovery method has advanced much since the 19th century (Dancey 1974: 98).

> There appears to be a widespread feeling that the survey alone can elucidate only a small amount of the total attributes of an archeological site. It is probable that many data available on the surface have been ignored and consequently lost. It is equally probable that many investigators have failed to extract as much information from a survey as they could have, had they not held a preconceived notion about the limited utility of a survey (Ruppé 1966: 313).

As archeology shifted to a regional focus the realization came that surveys could directly contribute to the solution of behavioral questions. Sampling at the regional level became an issue (Mueller 1974, 1975-ed., Binford 1964) but many field techniques have not changed. To be sure, archeologists are not unaware of the problem. The definition of a site has begun to haunt archeologists and some have given up the concept altogether (e.g., Dancey 1974, Thomas 1975). This question, however, is only one of the areas in which the archeologist needs to rethink the reliability of the survey. In the present study, five topics in survey reliability are addressed.

In all cases, some data are available and can be analyzed to provide a reliability estimate for the Truman Survey:

1. The effects of different kinds of survey conditions on site recovery – this includes kind and amount of ground cover, and rainfall on the surface.

2. Annual variation in ground surfaces and its implications for the scheduling of a survey.

3. The lessening of bias due to the adoption of a sampling strategy.

4. The efficiency of shovel testing.

5. Individual variation from surveyor to surveyor.

SURVEY CONDITIONS

The Truman Reservoir acquisition area offers the archeological surveyor most of the types of survey condition encountered in the Midwest – from cultivated fields, through abandoned fields, pastures, woods, to steep rocky slopes. Sites are found in all these kinds of places, but are not necessarily equally visible under all conditions. A complete report of the reliability of a survey should include a tabulation, at the very least, of the conditions under which sites were surveyed. These tabulations should include the kind and amount of ground cover, and how well rained on it has been – this of particular importance in plowed fields. A good example is found in an assessment by Chapman of effects of seasonal and ground cover variation on the impressions of a single site in Lake Pomme de Terre:

> For example, one site, 23HI-9, was first located in 1946 and was judged to be worthy of further investigation. At the time it was in an old cornfield and had been eroded by numerous rains.

> When the same site was checked during the summer of 1950, very few evidences could be seen and if the judgement of the site had been upon the basis of that survey, no further investigation would have been recommended. Flint flakes and a few flint cores were the only items found. The site had a relatively thick cover of weeds and grass, but was fairly clear in many places. The site was checked again during the summer of 1952. This time it contained a crop of soybeans and yielded much evidence of occupation suggesting that at least testing would be of value in gaining more information concerning it (Chapman 1954: 11).

Experience has shown that sites <u>can</u> be seen in all kinds of ground cover, even with a high percentage of ground cover. An evaluation of survey conditions for 116 sites in the Sangamon River valley of central Illinois suggested that ground cover density was less critical than rainfall for surveying sites in plowed fields (Roper 1975a: 35). That study unfortunately used only two percentage categories – 0-50% and 50-100%. It is, therefore, difficult to evaluate the effects of higher density ground cover on site recording in the Sangamon Valley. The Truman Reservoir, however, shows a greater variation in survey conditions than does the Sangamon River Valley. Further, unlike the Sangamon survey, records on ground cover in <u>all</u> areas surveyed are available for Stage II of the Truman Survey – not just places where sites were found. It is hoped that analysis of these data for a large number of sites and for the 106 surveyed transects will give some insight into the effects of ground cover on site recording.

We would correspondingly predict that woods, pasture, and wasteland (abandoned fields, etc.) should show a uniformly greater percentage of ground cover than should fields. It will be interesting to see how this affects the recovery of sites. Further, smaller streams should show larger proportions of woods and pastures than will main streams.

ANNUAL VARIATION IN SURFACES

Just as seasonal variation presented the prehistoric inhabitants with differential opportunities for resource acquisition, so does it also present the archeologist with different opportunities for survey.

It is expected that the seasonal differential will differentially affect different surfaces. For present purposes, it is predicted that woods, pasture, and abandoned fields will show little variation in percentage of ground cover over the year; on the other hand, cultivated fields present a highly variable face over the course of the year. It is further expected that the winter and spring months will be the most disparate in terms of ground cover.

SAMPLING STRATEGY

The purpose of a random sampling procedure in archeological survey is to be able to make statements about the population of sites, and to make these statements with a measurable amount of confidence. In the field, it means that the archeologist will survey areas that otherwise might be ignored or dismissed. It means collecting negative evidence as well as recording sites. However, a further implication is that the archeologist is forced to survey areas that are often considered as "unsurveyable." To meet the goals of the sampling design, however, this type of terrain must be traversed. If some of the other predictions are correct, sites will be found in this type of terrain, even if survey is somewhat more arduous. A number of benefits of shifting to a random sampling design should therefore accrue. These are phrased in terms of the Stage I and Stage II survey designations to be used here:

1. No difference should be seen in the ground cover and annual variation predictions listed earlier – i.e., perceived annual variation in ground cover and perceived ability to record sites in different ground cover conditions will be independent of survey strategy employed (i.e., probability or non-probability).

2. If smaller streams show more woods, pastures, etc., Stage I survey should overrepresent fields, and underrepresent smaller streams.

SHOVEL TESTING

The shovel testing strategy used in the Truman Survey was discretionary. Evaluation of this can be difficult – where no sites are recorded, especially in heavy ground cover, it is not always possible to tell if shovel testing would have revealed a site. In any event, several hypotheses to partially evaluate the efficacy of shovel testing are presented. A further goal is to see how good our surveyors' discretion was as to when to shovel test:

1. Shovel testing should not be independent of percent of ground cover – i.e., where ground cover is heavier, shovel testing should have been more frequently employed.

2. Shovel testing should not be independent of type of ground cover — it should be far more common in woods, pastures, and abandoned fields, and was probably rarely employed in fields.

3. If smaller streams really do present more woods, pastures, etc. to the surveyor, shovel testing should have been more frequently applied at sites on such streams and, in Stage II survey, in those strata with small streams.

INDIVIDUAL VARIATION

Surveyors vary in their perceptions of sites and survey situations. This is probably particularly acute in the case of the measured size of the sites. The prediction is made, therefore, that in fact the exact area of site (AOS) figures will probably be largely meaningless, although general trends may be reliable. There should be little difference from surveyor to surveyor in perception of the effects of other variables on recording sites.

The Truman Survey, from the very beginning, collected data to evaluate the survey for its reliability. These analyses are presented in the next chapter. It is hoped that by evaluating the survey from these five observational points of view, we will be in a better position to know how good the basis of our inferences will be. Surely, these will vary — in some cases, the data will be reliable, in others less so. We hope, therefore, to be able to specify where they are less so and to be able to make recommendations for strengthening the inference base, not only in further work in Truman Reservoir, but in other surveys in other parts of the Midwest and Plains.

Analysis and Reporting

The normal survey report would contain a report and description of sites recorded, a description and analysis of the survey collections, and a settlement pattern analysis of the sites — all brought together by one or two authors in a single, orderly report. Separate chapters might be separately authored, but would be logically organized. The present project used neither of these approaches.

The size of the project, the unbroken continuity of fieldwork for nearly 18 months, the ready lending of itself to smaller projects, plus the availability of graduate and undergraduate students to carry out separate projects during the academic year, all combined to lead to a different ordering of the analysis.

Four graduate students were employed as half-time research assistants during academic year 1975-1976. Alan S. Downer, Jr. and David E. Griffin, Jr. undertook the mapping of proto-Euro-American plant communities in a four-county area (Benton, Henry, Hickory, St. Clair counties) in conjunction with F. B. King of the Rodgers Shelter project at the Illinois State Museum. Downer and Griffin's work contributed to the vegetation synthesis presented by King in Volume X.

During academic year 1975-1976, Russell L. Miller also began the study of historic Euro-American settlement patterns in the lower Pomme de Terre River valley, reported in Volume VI. Stephen A. Chomko carried out the analysis of remains from sites tested in the Pomme de Terre River Valley (Volume VII). A fifth graduate student, William B. Butler, received a research assistantship from the American Archaeology Division to work on an analysis of chipped stone tools and debitage from sites in the Pomme de Terre River Valley.

Five graduate students were employed as half-time research assistants during academic year 1976-1977. David E. Griffin, Jr. and Michael K. Trimble were charged with the analysis of the chipped stone collected during the survey. They devised a classification and coding scheme for the collections, and performed a preliminary analysis of the chipped stone tools.

Russell L. Miller continued his study of historic settlement patterns. In addition to the present report, his analysis will form part of his M.A. thesis. Robert L. Warren carried out an analysis of faunal remains from testing conducted during the summer of 1976. Lisa G. Carlson reanalyzed ceramics from earlier investigations in Truman (then Kaysinger Bluff) Reservoir, and incorporated the ceramic collections from both the survey and the summer 1976 test excavations. Her analysis is included in Volume V, Part IV.

During the 1976-1977 year, two graduate students from the University of Arkansas, A.L. Novick and C. E. Cantley, also undertook the analysis of collections from rockshelters tested under their supervision in the summer of 1976. These tests are reported in Volume VIII.

When the fieldwork terminated in December 1976, several of the surveyors were retained to help complete the processing of records and collections, and to write up remaining portions of the collections. Deborah E. House undertook the analysis of hematite, reported in Volume V, Part III. Michael R. Piontkowski analyzed the collections from two buried sites, tested under his supervision in the summer of 1976 (Volume IX, Part I) and carried out analysis of ground stone (Volume V, Part II). Projectile point identifications were made and written (Volume V, Part V) by Donna C. Roper and Michael R. Piontkowski.

During the course of the entire survey a settlement pattern analysis, following from the research design (Chapter III) was undertaken by Donna C. Roper. Some preliminary results of that analysis are presented later in this volume (Chapter VII).

Thus, all the elements felt necessary for an adequate survey report are present, although scattered. All analyses were coordinated by Roper who has attempted to summarize them in one of the concluding sections of this volume.

CHAPTER V

RESULTS: THE SITES

Stage I Survey

The first stage of the fieldwork was essentially a traditionally structured and performed general reconnaissance. It had several purposes: (1) to become familiar with the reservoir area and get an overview of its archeology, (2) to become familiar with the survey conditions to be encountered in the reservoir area, (3) to fulfill the terms of Purchase Orders DACW41-75-M-1854 and DACW41-75-M-2065 which specified surveys of borrow areas and relocations and of the Pomme de Terre River Valley, respectively, and (4) to gain the time necessary to design a less biased survey strategy – i.e., since the project began with immediate fieldwork, no lead time was available to design a sampling strategy for immediate implementation.

Fieldwork began on 16 June 1975 with three two-person survey crews, led by Alan S. Bohnert, William B. Butler, and Ann M. Johnson, and one five-person testing crew led by Stephen A. Chomko. Several weeks later, the testing crew was reduced by two, and a fourth two-person survey crew was created, led by Michael R. Piontkowski. Shortly after that, the testing program was terminated, and the testing crew became a fifth survey crew. The 1975 summer field season ended on 15 August.

Two weeks later, the project resumed, with most of September devoted to cataloging the summer's backlog. Fieldwork, therefore, resumed in late September 1975. At this time, 3 two-person crews, led by Andrea L. Novick,

M. R. Piontkowski, and Christopher M. Young concentrated on surveys of borrow areas and relocations (October) and more intensive work in the Pomme de Terre Valley (November). Although reports on these two months' work have already been submitted to the Corps of Engineers (Roper 1975b, 1976a), the analysis of those sites was reserved for inclusion in the present report.

In addition to the above listed full-time crews, Terrell Martin of Clinton, Missouri was employed half-time to conduct survey in the Clinton area. Martin was employed from September 1975 through November 1976 and concentrated on an intensive survey of a 56-section area on the South Grand River and Deepwater Creek south of Clinton. The sites Martin surveyed are included in the present report.

Miscellaneous sites also included in Stage I survey include those recorded by visitors to the project, or other interested parties. The collections and records from these sites were always integrated with regular collections and records and are treated no differently from regular survey records.

Finally, as indicated, a testing program was carried out for about one month from mid-June to mid-July 1975. Work concentrated at several rockshelters and open sites in the Pomme de Terre River Valley within a few miles of Rodgers Shelter. Results of these tests are described by S. A. Chomko in Volume VII of the present report.

Stage I of the Truman Reservoir survey is therefore defined as all survey accomplished between mid-June 1975 and late February 1976, including that previously reported to the Corps of Engineers, plus Martin's survey. (As will be seen below, Martin's survey was employed for parts of Stage II survey. The randomly selected transects were projected onto his coverage map and his survey was considered the survey of those transects. Thus, 14 of Martin's sites are included under Stage II rather than Stage I survey.)

Daily Survey Logs suggest that about 38,246 acres (59.76 mi^2 = 152.98 km^2) were covered during Stage I survey. Of this, 29,296 acres (45.78 mi^2 = 117.18 km^2) were covered during general reconnaissance in the summer of 1975, and 8950 acres (13.98 mi^2 = 35.80 km^2) during the November 1975 survey of the Pomme de Terre Valley. These coverage figures are undoubtedly somewhat misleading, however, particularly for the summer 1975 survey. That summer was hot and dry and in many cases "area surveyed" undoubtedly included the many fields inspected in a cursory fashion and marked for survey after a good rainfall. It certainly was not always an intensive survey.

Within the area, 887 sites were recorded. Of these, 38 were in borrow areas and relocations; the other 849 were general reconnaissance sites, 65 of which were included in the lower Pomme de Terre River report. Only 38 of the 865 (4.3%) had been previously reported to the Archaeological Survey of Missouri (Table 3). On several occasions, however, previously reported sites were revisited without being recorded (obvious cases being such sites as Rodgers Shelter, Blackwell Cave, and Phillips Spring).

The large number of sites recorded precludes individual descriptions of each site. Such descriptions would be tedious to write, expensive and bulky to reproduce, boring to read, and impossible to assess. Relevant characteristics of the sites are therefore listed (Table 4). Site forms, maps, and photographs have been prepared and transmitted to the Corps of Engineers in a set of separate volumes. Copies are also on file with

TABLE 3

Previously Recorded Sites Resurveyed During Stage I Survey

Site No.	Survey Stratum	Site Type	Original Date of Record	Original Recorder	Tested or Excavated?	References (if any)
23BE13	3	Open	?	Wrench	No	-
23BE19	3	Open	?	?	No	-
23BE104	3	Open	10/59	Heldman & Pangborn	No	Keller 1964
23BE105	3	Open	10/59	Heldman & Pangborn	No	Keller 1964
23BE110	2	Open	?	?	No	-
23BE113	2	Open	?	?	No	Keller 1964
23BE166	2	Open	1/71	J. Feagins	No	-
23SR21	7	Shelter	1959	Shippee	Yes	Keller 1964
23SR75	11	Open	?	?	No	-
23SR101	7	Open	1959	Shippee	No	Keller 1964
23SR102	7	Open	1959	Shippee	No	Keller 1964
23SR136	7	Shelter	?	Henning	No	-
23SR146	7	Open	1/61	P. Brophy	No	-
23SR153	10	Open	2/61	E. J. Haddix	No	-
23SR196	10	Shelter	4/72	F. Kidwell	Yes	-
23SR197	10	Shelter	4/72	F. Kidwell	No	McMillan 1965
23HE8	20	Open	1975	T. Martin	No	-
23HE9	19	Open	1975	T. Martin	No	-
23HE10	21	Open	1975	T. Martin	No	-
23HE11	21	Shelter	3/75	T. Martin	No	-
23HE12	22	Open	1975	T. Martin	No	-
23HE13	21	Open	?	?	No	-
23HE14	20	Open	?	?	No	-
23HE15	21	Open	?	?	No	-
23HE16	20	Open	1975	T. Martin	No	-
23HE17	20	Open	1975	T. Martin	No	-
23HE114	20	Open	1959	Shippee	No	Keller 1964
23HE116	20	Open	1959	Shippee	No	Keller 1964
23HE117	20	Open	1959	Shippee	No	Keller 1964
23HE119	19	Open	1959	Shippee	No	Keller 1964
23HE122	19	Open	1959	Shippee	No	Keller 1964
23HE123	21	Open	1959	Shippee	No	Keller 1964
23HE124	21	Open	1959	Shippee	No	Keller 1964
23HE126	20	Open	1959	Shippee	No	Keller 1964
23HE131	20	Open	1959	Shippee	No	Keller 1964
23CE33	7	Open	?	Collins	No	-
23CE45	7	Open	?	?	No	-
23CE49	7	Open	8/61	P. Brophy	No	-

TABLE 4

Site Data - Stage I Survey Sites

Site No.	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi) Rank of Nearest Water[1]	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor[2]
Stratum I - Middle Pomme de Terre River										
23HI223[3]	800	70	.1	W	30,000	open	0-10	pasture	6	1
23HI224[3]	780	50	.1	W	5,000	open	0-10	pasture	6	1
23HI225[3]	740	10	.1	W	300	open	10-50	woods	6	1
23HI226[3]	700	20	.1	SE	unknown	open	0-10	pasture	6	1
23HI227[3]	700	20	.1	NW	4,500	open	90-100	field	6	1
23HI228[3]	700	20	.1	NW	600	open	90-100	field	6	1
23HI229[3]	740	60	.1	W	150	shelter	0-10	na	6	1
23HI230[3]	710	20	.1	S	unknown	shelter	0-10	na	6	1
23HI231[3]	700	10	.1	open	unknown	open	90-100	pasture	6	1
23HI232[3]	710	20	.1	NW	1,000	open	0-10	field	6	1
23HI233[3]	700	10	.1	open	3,000	open	0-10	field	6	1
23HI234[3]	700	10	.1	open	1,000	open	0-10	field	6	1
23HI235[3]	740	50	.1	N	1,000	open	0-10	field	6	1
23HI236[3]	710	20	.1	N	unknown	open	90-100	field	6	1
23HI237[3]	760	70	.1	NW	unknown	open	90-100	field	6	1
23HI238[3]	700	20	.2	NW	600	open	0-10	field	6	1
23HI239[3]	690	10	.1	E	5,000	open	50-90	field	6	1
23HI240[3]	690	10	.1	E	3,000	open	50-90	field	6	1
23HI241[3,4]	700	20	.1	W	4,000	open	0-10	field	6	2
23HI242[3]	700	20	.1	W	6,000	open	0-10	field	6	2
23HI243[3]	700	20	.1	W	2,400	open	0-10	field	6	2
23HI244[3]	700	20	.1	W	800	open	0-10	field	6	2
23HI245[3]	730	50	.1	NW	400	open	0-10	field	6	2
23HI246[3,4]	720	40	.1	SW	60	shelter	0-10	na	6	2
23HI247[3,4]	720	40	.1	SW	120	shelter	0-10	na	6	2
23HI248[3]	720	40	.1	SW	400	shelter	0-10	na	6	2
23HI249[3]	800	90	.1	NW	200	open	0-10	road	10	4
23HI250[3]	700	20	.1	S	1,000	open	50-90	pasture	10	4
23HI251[3]	700	20	.1	SE	1,000	open	50-90	pasture	10	4
23HI252[3]	720	40	.1	NE	1,500	open	50-90	pasture	10	4
23HI253[3]	740	60	.1	E	1,000	open	50-90	pasture	10	4
23HI254[3]	720	40	.1	E	60	open	10-50	pasture	10	4
23HI255[3]	740	60	.1	E	unknown	open	10-50	waste	10	4
23HI256[5]	850	60	.2	N	2,000	open	0-10	road	10	4
23HI257[3]	720	40	.1	NW	unknown	open	50-90	field	10	4
23HI258[3]	700	20	.1	N	30	open	50-90	field	11	6

TABLE 4: Continued

Site Data - Stage I Survey Sites

Site No.	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water[1]	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor[2]
23HI260[3]	700	20	.1	1	N	unknown	open	90-100	field	11	4
23HI261[3]	700	20	.1	9	W	120	open	0-10	road	11	4
23HI263[3]	820	140	.2	1	SW	50	open	90-100	woods	11	4
23HI264[3]	700	20	.1	9	W	unknown	open	90-100	field	11	4
23HI265[3]	730	30	.1	9	SE	10	open	90-100	pasture	11	6
23BE195	670	10	.1	3	open	500	open	50-90	field	6	7
23BE196	670	10	.1	3	open	2,500	open	50-90	field	6	7
23BE197	670	0	.1	3	open	600	open	10-50	field	6	7
23BE250	760	90	.1	9	open	5,000	open	0-10	field	6	1
23BE251	680	10	.3	1	N	100	open	0-10	field	6	1
23BE252	680	10	.1	9	N	100	open	0-10	field	6	1
23BE253	690	20	.1	9	N	1,000	open	0-10	field	6	1
23BE254	690	20	.1	9	N	3,000	open	10-50	field	6	1
23BE259	680	20	.1	1	open	3,000	open	0-10	field	6	1
23BE260	680	20	.1	1	open	1,000	open	0-10	field	6	1
23BE261	680	20	.1	1	open	100	open	0-10	field	6	1
23BE414	880	200	.2	1	W	2,500	open	0-10	feedlot	7	1
23BE457	720	50	.2	1	open	250	open	0-10	field	10	4
23BE458	720	50	.1	1	open	200	open	0-10	field	10	4
23BE459	730	60	.1	1	E	200	open	0-10	field	10	4
23BE463	690	20	.1	9	NE	50	open	10-50	woods	10	6
23BE464	700	30	.2	9	N	100	open	unknown	field	10	6
23BE465	700	30	.2	9	N	100	open	0-10	field	10	6
23BE466	690	20	.2	9	open	300	open	0-10	field	10	6
23BE467	690	20	.2	1	open	50	open	0-10	field	10	6
23BE468	690	20	.2	1	open	50	open	0-10	field	10	6
23BE469	680	10	.3	1	N	100	open	0-10	field	10	6
23BE470	680	10	.1	9	open	unknown	open	10-50	field	10	6
23BE471	680	10	.1	1	open	3,000	open	10-50	pasture	11	6
23BE473	700	30	.1	9	E	50	open	50-90	pasture	11	6
23BE474	700	30	.1	9	N	50	open	90-100	pasture	11	6
Stratum II - Lower Pomme de Terre River											
23BE110	810	130	.1	1	open	4,000	open	90-100	woods	8	2
23BE113	680	0	.1	2	open	4,500	open	90-100	field	6	7
23BE166	660	15	.3	1	open	1,500	open	0-10	field	7	3
23BE178	670	30	.1	1	E	100	open	90-100	field	6	7
23BE180	670	20	.1	9	E	unknown	open	90-100	field	6	7

TABLE 4: Continued

Site Data - Stage I Survey Sites

Site No.	Elevation (Ft. MSL)	Height Above River	Distance to Water (. mi)	Rank of Nearest Water[1]	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor[2]
23BE181	660	10	.1	1	E	250	open	50-90	field	6	7
23BE182	670	20	.1	9	E	100	open	0-10	field	6	7
23BE183	670	20	.1	9	E	5,250	open	0-10	field	6	7
23BE185	670	30	.1	3	open	1,088	open	0-10	field	6	3
23BE186	670	30	.1	9	open	unknown	open	0-10	field	6	3
23BE187	660	10	.1	9	E	500	open	0-10	field	6	7
23BE207	680	20	.2	3	open	unknown	open	0-10	field	6	3
23BE208	680	40	.2	1	W	20	open	90-100	church-yard	6	3
23BE209	670	20	.2	9	S	5,500	open	10-50	field	6	3
23BE210	660	10	.1	9	open	2,415	open	10-50	field	6	3
23BE211	660	10	.2	9	S	4,600	open	10-50	field	6	3
23BE212	660	10	.1	9	open	400	open	10-50	field	6	3
23BE213	660	10	.1	9	open	unknown	open	10-50	field	6	3
23BE214	700	30	.1	9	N	unknown	open	90-100	pasture	6	2
23BE215	690	20	.1	3	NW	unknown	open	90-100	pasture	6	2
23BE216	710	40	.1	1	N	unknown	open	90-100	pasture	6	2
23BE217	700	30	.1	9	N	unknown	open	90-100	pasture	6	2
23BE229	660	20	.1	9	open	107	open	0-10	field	6	3
23BE230	660	20	.1	9	open	690	open	0-10	field	6	3
23BE231	660	20	.2	9	open	unknown	open	0-10	field	6	3
23BE232	660	20	.1	9	open	unknown	open	0-10	field	6	3
23BE240	670	10	.1	9	open	37,500	open	10-50	field	6	3
23BE241	670	10	.1	9	open	44,800	open	10-50	field	6	3
23BE242	670	10	.1	1	open	700	open	10-50	field	6	3
23BE243	680	20	.1	1	SW	6,150	open	10-50	field	6	3
23BE255	750	80	.1	3	open	100	open	unknown	woods	6	3
23BE257	700	40	.1	3	open	48	open	90-100	pasture	6	3
23BE258	700	40	.1	9	SW	553	open	10-50	woods	6	3
23BE262	700	30	.1	1	W	700	open	0-10	field	6	1
23BE263	710	50	.1	1	W	100	open	0-10	field	6	1
23BE264	700	30	.1	1	W	100	open	0-10	field	6	1
23BE265	670	10	.1	3	W	1,750	open	0-10	field	6	3
23BE266	670	10	.1	3	open	5,000	open	0-10	field	6	3
23BE268	680	20	.1	4	open	20,000	open	0-10	field	6	3
23BE269	670	10	.1	3	SW	9,750	open	0-10	field	6	3
23BE288	660	0	.2	9	open	1,600	open	10-50	field	6	3
23BE289	660	0	.1	1	open	18,750	open	10-50	field	6	3

TABLE 4: Continued

Site Data - Stage I Survey Sites

Site No.	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water[1]	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor[2]
23HI260[3]	700	20	.1	1	N	unknown	open	90-100	field	11	4
23HI261[3]	700	20	.1	9	W	120	open	0-10	road	11	4
23HI263[3]	820	140	.2	1	SW	50	open	90-100	woods	11	4
23HI264[3]	700	20	.1	9	W	unknown	open	90-100	field	11	4
23HI265[3]	730	30	.1	9	SE	10	open	90-100	pasture	11	6
23BE195	670	10	.1	3	open	500	open	50-90	field	6	7
23BE196	670	10	.1	3	open	2,500	open	50-90	field	6	7
23BE197	670	0	.1	3	open	600	open	10-50	field	6	7
23BE250	760	90	.1	9	open	5,000	open	0-10	field	6	1
23BE251	680	10	.3	1	N	100	open	0-10	field	6	1
23BE252	680	10	.1	9	N	100	open	0-10	field	6	1
23BE253	690	20	.1	9	N	1,000	open	0-10	field	6	1
23BE254	690	20	.1	9	N	3,000	open	10-50	field	6	1
23BE259	680	20	.1	1	open	3,000	open	0-10	field	6	1
23BE260	680	20	.1	1	open	1,000	open	0-10	field	6	1
23BE261	680	20	.1	1	open	100	open	0-10	field	6	1
23BE414	880	200	.2	1	W	2,500	open	0-10	feedlot	7	1
23BE457	720	50	.2	1	open	250	open	0-10	field	10	4
23BE458	720	50	.1	1	open	200	open	0-10	field	10	4
23BE459	730	60	.1	1	E	200	open	0-10	field	10	4
23BE463	690	20	.1	9	NE	50	open	10-50	woods	10	6
23BE464	700	30	.2	9	N	100	open	unknown	field	10	6
23BE465	700	30	.2	9	N	100	open	0-10	field	10	6
23BE466	690	20	.2	9	open	300	open	0-10	field	10	6
23BE467	690	20	.2	1	open	50	open	0-10	field	10	6
23BE468	690	20	.2	1	open	50	open	0-10	field	10	6
23BE469	680	10	.3	1	N	100	open	0-10	field	10	6
23BE470	680	10	.1	9	open	unknown	open	10-50	field	10	6
23BE471	680	10	.1	1	open	3,000	open	10-50	pasture	11	6
23BE473	700	30	.1	9	E	50	open	50-90	pasture	11	6
23BE474	700	30	.1	9	N	50	open	90-100	pasture	11	6
Stratum II - Lower Pomme de Terre River											
23BE110	810	130	.1	1	open	4,000	open	90-100	woods	8	2
23BE113	680	0	.1	2	open	4,500	open	90-100	field	6	7
23BE166	660	15	.3	1	open	1,500	open	0-10	field	7	3
23BE178	670	30	.1	1	E	100	open	90-100	field	6	7
23BE180	670	20	.1	9	E	unknown	open	90-100	field	6	7

TABLE 4: Continued

Site Data - Stage I Survey Sites

Site No.	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water[1]	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor[2]
23BE290	660	0	.1	1	open	1,600	open	10-50	field	6	3
23BE291	670	10	.1	1	open	2,000	open	10-50	field	6	3
23BE292	660	0	.1	1	open	1,200	open	10-50	field	6	3
23BE293	680	10	.1	3	open	5,460	open	10-50	field	6	3
23BE294	690	30	.3		W	400	open	0-10	field	6	1
23BE295	680	20	.1	9	open	5,000	open	0-10	field	6	1
23BE296	680	20	.1	9	open	500	open	0-10	field	6	1
23BE297	680	20	.1	9	open	300	open	0-10	field	6	1
23BE318	660	0	.1	4	open	4,830	open	0-10	field	7	3
23BE319	675	5	.1	1	open	5,000	open	0-10	field	7	3
23BE320	675	5	.1	9	open	20,000	open	0-10	field	7	3
23BE321	675	5	.1	1	open	1,000	open	0-10	field	7	3
23BE322	675	5	.1	9	open	5,250	open	10-50	field	7	3
23BE323	675	5	.1	9	open	3,000	open	10-50	field	7	3
23BE335	680	30	.1	2	open	17	open	90-100	woods	7	3
23BE336	660	10	.1	1	open	unknown	open	10-50	field	7	3
23BE337	670	20	.1	9	open	unknown	open	10-50	field	7	3
23BE338	660	10	.1	9	open	450	open	10-50	field	7	3
23BE339	660	10	.1	9	open	1,500	open	10-50	field	7	3
23BE340	660	10	.1	9	open	unknown	open	10-50	field	7	3
23BE341	670	20	.2	9	open	1,000	open	10-50	field	7	3
23BE342	670	20	.2	9	NE	unknown	open	10-50	field	7	3
23BE343	670	20	.1	2	NW	2,250	open	0-10	field	7	3
23BE355	680	30	.1	9	open	1,200	open	10-50	field	7	5
23BE360	680	20	.1	1	open	unknown	open	50-90	field	7	1
23BE361	680	20	.2	9	open	12,500	open	50-90	field	7	5
23BE362	680	20	.1	9	open	40	open	50-90	field	7	5
23BE363	680	20	.1	9	open	6,525	open	50-90	field	7	5
23BE364	680	20	.2	9	open	1,500	open	50-90	field	7	5
23BE365	680	20	.1	9	open	1,800	open	50-90	field	7	5
23BE366	680	20	.1	9	open	37,500	open	50-90	field	7	5
23BE376	700	40	.1	2	open	150	open	50-90	field	7	3
23BE377	710	50	.1	1	NE	500	open	10-50	field	7	3
23BE378	690	30	.1	2	open	unknown	open	90-100	field	7	3
23BE379	680	20	.1	2	open	500	open	90-100	field	7	3
23BE382	750	90	.2	1	open	10,000	open	10-50	pasture	7	1
23BE404	670	20	.2	1	open	500	open	10-50	field	7	3

TABLE 4: Continued

Site Data - Stage I Survey Sites

Site No.	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water[1]	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor[2]
23BE405	660	10	.1	1	open	unknown	open	10-50	field	7	3
23BE406	660	10	.1	9	open	unknown	open	10-50	field	7	3
23BE407	670	20	.1	2	NE	1,500	open	10-50	field	7	3
23BE426	665	5	.3	9	open	unknown	open	10-50	field	6	3
23BE445	680	10	.1	1	open	unknown	open	90-100	pasture	8	3
23BE447	700	40	.2	9	SE	60	shelter	10-50	na	8	2
23BE453	680	0	.1	1	open	100	open	90-100	pasture	8	3
23BE454	700	0	.1	1	open	100	open	90-100	pasture	8	3
23BE456	680	20	.2	2	open	2	open	10-50	field	8	3
Stratum III - Little Pomme de Terre River											
23BE13	680	10	.1	2	E	500	open	50-90	waste	7	3
23BE19	680	30	.2	4	open	1,000	open	90-100	field	6	7
23BE104	670	10	.1	4	open	3,000	open	0-10	field	6	7
23BE105	720	10	.2	4	S	3,600	open	0-10	field	6	7
23BE179	660	20	.1	4	open	3,000	open	50-90	field	6	7
23BE184	670	30	.1	4	SE	100	open	10-50	field	6	7
23BE188	680	20	.1	1	SE	1,200	open	50-90	field	6	7
23BE189	670	10	.1	4	open	2,500	open	0-10	field	6	7
23BE190	670	10	.1	1	NE	3,500	open	0-10	field	6	7
23BE191	670	10	.1	4	open	2,100	open	0-10	field	6	7
23BE192	670	10	.1	1	open	3,000	open	0-10	field	6	7
23BE193	670	10	.1	4	open	unknown	open	0-10	field	6	7
23BE194	670	10	.1	4	open	13,000	open	0-10	field	6	7
23BE198	670	0	.1	4	open	300	open	0-10	field	6	7
23BE199	670	10	.1	4	NW	4,000	open	10-50	field	6	7
23BE200	670	10	.1	4	NW	400	open	10-50	field	6	7
23BE201	680	10	.1	1	E	200	open	0-10	field	6	7
23BE202	680	10	.1	1	SE	500	open	0-10	field	6	7
23BE203	680	10	.1	2	open	1,300	open	0-10	field	6	7
23BE204	680	10	.1	4	open	8,000	open	0-10	field	6	7
23BE205	690	10	.1	4	E	1,200	open	0-10	field	6	7
23BE206	690	10	.1	4	E	100	open	0-10	field	6	7
23BE218	730	10	.1	4	E	3,500	open	10-50	field	6	7
23BE219	720	30	.2	2	E	unknown	open	10-50	field	6	7
23BE220	700	10	.1	2	open	unknown	open	10-50	field	6	7
23BE221	700	10	.1	4	open	unknown	open	10-50	field	6	7
23BE222	690	0	.1	4	E	unknown	open	10-50	field	6	7

TABLE 4: Continued

Site Data - Stage I Survey Sites

Site No.	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water[1]	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor[2]
23BE223	700	10	.2	3	E	unknown	open	10-50%	field	6	7
23BE224	690	0	.1	4	open	unknown	open	10-50	field	6	7
23BE225	700	10	.2	3	open	unknown	open	10-50	field	6	7
23BE226	700	10	.1	3	open	unknown	open	10-50	field	6	7
23BE227	700	10	.1	3	open	unknown	open	10-50	field	6	7
23BE228	710	20	.1	3	open	unknown	open	10-50	field	6	7
23BE233	710	20	.1	2	open	16,000	open	10-50	field	6	7
23BE234	710	20	.1	3	open	1,600	open	10-50	field	6	7
23BE235	710	20	.2	4	open	1,800	open	0-10	field	6	7
23BE236	700	10	.2	4	open	1,200	open	0-10	field	6	7
23BE237	700	20	.1	3	open	600	open	0-10	field	6	7
23BE238	700	10	.1	3	open	400	open	0-10	field	6	7
23BE239	750	0	.1		open	unknown	open	0-10	field	6	7
23BE244	750	50	.3	4	N	unknown	open	50-90	field	6	7
23BE245	710	10	.1	4	N	1,600	open	10-50	field	6	7
23BE246	710	10	.1	4	open	3,000	open	10-50	field	6	7
23BE247	710	10	.1	4	E	1,800	open	0-10	field	6	7
23BE248	710	10	.1	4	open	1,500	open	0-10	field	6	7
23BE249	710	10	.1	4	open	1,600	open	0-10	field	6	7
23BE270	720	10	.1	1	W	2,100	open	0-10	field	6	7
23BE271	730	20	.1	1	NW	1,400	open	0-10	field	6	7
23BE272	720	10	.1	4	open	600	open	0-10	field	6	7
23BE273	720	10	.1	4	open	5,400	open	0-10	field	6	7
23BE274	730	10	.1	4	open	1,300	open	0-10	field	6	7
23BE275	730	10	.1	4	SE	2,700	open	10-50	field	6	7
23BE276	730	10	.1	4	NW	2,300	open	10-50	field	6	7
23BE277	740	10	.1	4	S	7,000	open	10-50	field	6	7
23BE278	720	20	.2	4	open	16,200	open	0-10	field	6	7
23BE279	710	10	.1	4	NE	500	open	0-10	field	6	7
23BE280	720	10	.1	4	open	6,300	open	0-10	field	6	7
23BE281	720	10	.1	4	open	900	open	0-10	field	6	7
23BE282	720	10	.1	4	open	unknown	open	0-10	field	6	7
23BE283	730	20	.2	4	E	5,400	open	0-10	field	6	7
23BE284	740	20	.1	4	N	7,200	open	0-10	field	6	7
23BE285	720	10	.1	4	open	4,300	open	0-10	field	6	7
23BE286	720	10	.1	4	W	1,000	open	0-10	field	6	7
23BE287	720	10	.1	4	W	2,000	open	0-10	field	6	7

TABLE 4: Continued

Site Data - Stage I Survey Sites

Site No.	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water[1]	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor[2]
23BE300	740	10	.1	4	SE	2,000	open	10-50	field	6	7
23BE301	740	10	.1	4	N	unknown	open	10-50	field	6	7
Stratum IV - Hogles Creek											
23BE298	680	30	.3	4	open	600	open	0-10	field	6	1
23BE299	680	30	.2	4	open	3,000	open	0-10	field	6	1
23BE302	720	70	.1	4	open	1,300	open	0-10	field	6	7
23BE303	720	70	.2	4	open	1,200	open	0-10	field	6	7
23BE304	720	70	.2	4	open	unknown	open	0-10	field	6	7
23BE305	720	70	.1	4	SE	3,000	open	0-10	field	6	7
23BE306	720	70	.1	4	SW	3,300	open	0-10	field	6	7
23BE308	720	70	.1	10	open	450	open	10-50	field	7	7
23BE309	710	60	.1	2	open	5,000	open	10-50	field	7	7
23BE310	710	60	.1	2	open	3,500	open	10-50	field	7	7
23BE311	690	40	.1	4	open	900	open	0-10	field	7	7
23BE312	690	40	.1	2	open	2,000	open	0-10	field	7	7
23BE324	710	50	.1	4	open	900	open	0-10	field	7	7
23BE325	710	50	.1	4	open	1,350	open	0-10	field	7	7
23BE326	710	50	.1	4	open	400	open	0-10	field	7	7
23BE327	710	50	.1	4	SE	2,300	open	0-10	field	7	7
23BE330	740	80	.1	4	SE	500	open	50-90	field	7	7
23BE331	740	80	.1	4	open	800	open	50-90	field	7	7
23BE408	700	40	.1	4	open	4,500	open	50-90	field	7	1
23BE409	700	40	.1	4	open	5,000	open	50-90	field	7	1
23BE410	690	30	.1	4	open	1,000	open	50-90	field	7	1
23BE411	690	30	.1	4	open	4,000	open	50-90	field	7	1
23BE412	690	30	.1	4	open	10,000	open	50-90	field	7	1
23BE413	700	40	.1	4	open	900	open	50-90	field	7	1
Stratum V - Bear Creek											
23SR411[5]	900	210	.1	1	E	70	open	0-10	road	10	4
Stratum VI - Weaubleau Creek											
23SR384	780	90	.1	1	S	2,000	open	90-100	field	8	7
23SR385	770	80	.1	1	W	200	open	50-90	field	8	7
23SR386	730	40	.2	1	W	100	open	10-50	field	8	7
Stratum VII - Sac River											
23SR21	710	0	.1	9	S	400	shelter	0-10	woods	7	2
23SR101	710	10	.2	9	open	2,800	open	50-90	pasture	8	2
23SR102[5]	740	30	.1	1	N	unknown	open	unk.	field	11	4

TABLE 4: Continued

Site Data - Stage I Survey Sites

Site No.	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water[1]	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor[2]
23SR136[4,5]	780	50	.2	3	open	unknown	shelter	0-10	na	11	4
23SR146	720	10	.1	2	open	400	open	10-50	field	7	2
23SR274[5]	730	10	.1	9	E	4,200	open	50-90	field	7	2
23SR275	720	0	.2	9	E	800	open	50-90	field	7	2
23SR276[5]	740	20	.1	9	W	3,600	open	10-50	field	7	2
23SR277	780	70	.3	1	open	400	open	50-90	barnyard	7	2
23SR278	750	40	.3	1	open	unknown	open	90-100	pasture	7	2
23SR289	720	10	.2	1	open	1,600	open	50-90	field	7	2
23SR290	780	70	.4	1	open	unknown	open	50-90	field	7	2
23SR291	750	40	.1	9	open	120	open	0-10	woods	7	2
23SR292	740	40	.1	9	SW	400	open	50-90	woods	7	2
23SR293	800	80	.2	9	open	600	open	90-100	woods	7	2
23SR294	730	10	.1	9	SW	800	open	90-100	woods	7	2
23SR295	720	10	.1	9	NE	4,000	open	50-90	field	7	2
23SR296	710	0	.1	9	SE	3,000	open	50-90	field	7	2
23SR297	770	60	.2	9	open	unknown	open	50-90	pasture	7	2
23SR300	720	20	.1	2	E	unknown	open	50-90	pasture	7	2
23SR301	770	70	.4	2	open	150	open	unknown	field	7	2
23SR302	770	70	.3	1	open	4,500	open	10-50	field	7	2
23SR303	770	70	.5	1	open	5,000	open	10-50	field	7	2
23SR304	770	70	.2	1	open	unknown	open	90-100	road	7	2
23SR305[5]	780	80	.2	1	open	2,000	open	50-90	field	7	2
23SR306	750	50	.3	9	open	unknown	open	90-100	pasture	7	2
23SR310	740	40	.1	1	open	1,000	open	0-10	waste	7	2
23SR319	760	30	.1	1	NW	unknown	open	90-100	field	7	2
23SR320	750	20	.1	1	N	unknown	open	90-100	field	7	2
23SR321	760	30	.2	1	N	unknown	open	90-100	field	7	2
23SR322	740	10	.2	1	N	4,000	open	90-100	field	7	2
23SR323	750	20	.3	1	NE	unknown	open	90-100	field	7	2
23SR324	750	20	.2	1	NW	unknown	open	90-100	woods	7	2
23SR325	750	20	.1	1	N	1,500	open	unknown	field	7	2
23SR326	740	10	.1	1	N	1,500	open	50-90	field	7	2
23SR329	720	0	.1	9	W	unknown	open	90-100	church-yard	8	2
23SR361	710	10	.3	9	E	5,000	open	90-100	waste	8	7
23SR371	800	100	.4	1	open	2,000	open	10-50	pasture	8	2
23SR372	750	50	.5	1	open	1,500	open	10-50	pasture	8	2
23SR373	720	20	.3	9	SE	2,000	open	50-90	pasture	8	2

TABLE 4: Continued

Site Data - Stage I Survey Sites

Site No.	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water[1]	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor[2]
23SR374	720	20	.1	4	open	unknown	open	50-90	farmyard	8	2
23SR375	710	10	.1	4	open	unknown	open	10-50	pasture	8	2
23SR376	790	90	.2	1	open	unknown	open	90-100	pasture	8	2
23SR377	790	80	.2	1	open	unknown	open	90-100	pasture	8	2
23SR378	710	10	.1	9	N	unknown	open	10-50	pasture	8	2
23SR379	750	50	.1	9	N	unknown	open	50-90	pasture	8	2
23SR381	760	60	.2	9	open	unknown	open	90-100	pasture	7	2
23SR382	750	40	.1	9	open	120	open	unknown	woods	7	2
23SR408[5]	730	30	.1	4	NW	50	open	50-90	woods	10	4
23SR409[5]	700	0	.1	9	S	1,400	open	0-10	yard	10	4
23SR410[5]	750	50	.2	9	open	200	open	0-10	field	10	4
23SR415[5]	720	10	.1	3	SE	5	shelter	0-10	na	11	4
23SR417	770	60	.2	2	open	300	open	0-10	cleared area	12	6
23SR418	730	30	.1	9	open	1,820	open	90-100	waste	12	6
23SR419	730	30	.1	9	open	5,400	open	90-100	waste	12	6
23CE33	850	110	.2	3	open	unknown	open	90-100	woods	8	2
23CE45	750	10	.1	1	NW	2,500	open	10-50	field	8	2
23CE49	760	20	.1	1	E	2,000	open	50-90	field	7	2
23CE216	760	20	.1	1	SE	unknown	open	90-100	roadcut	8	2
23CE217	750	10	.1	4	N	unknown	open	90-100	field	8	2
23CE218	750	10	.1	4	S	1,000	open	50-90	field	8	2
23CE219	740	0	.1	4	W	1,500	open	10-50	field	8	2
23CE220	740	0	.1	4	W	1,000	open	50-90	field	8	2
23CE221	800	60	1.1	3	open	2,000	open	90-100	woods	8	2
Stratum VIII - Salt Creek											
23SR380	720	20	.1	4	open	2,000	open	10-50	feedlot	8	2
23SR383	730	20	.1	4	open	5,000	open	90-100	woods	7	7
Stratum IX - Gallinipper Creek											
23SR330	690	0	.1	4	open	unknown	open	90-100	field	7	7
23SR331	700	10	.1	4	open	250	open	50-90	field	7	7
23SR332	700	10	.1	4	open	250	open	10-50	field	7	7
23SR333	700	10	.1	4	open	200	open	10-50	field	7	7
23SR334	700	10	.1	4	E	300	open	10-50	field	7	7
23SR335	700	10	.1	4	E	900	open	10-50	field	7	7
23SR336	700	10	.2	4	SE	400	open	10-50	field	8	7
23SR337	700	10	.1	4	open	150	open	10-50	field	8	7

TABLE 4: Continued

Site Data - Stage I Survey Sites

Site No.	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water[1]	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor[2]
Stratum X - Upper Osage River											
23SR153	740	40	.1	4	open	4,000	open	0-10	field	8	2
23SR196	750	60	.1	10	SE	unknown	shelter	90-100	na	8	7
23SR197	760	70	.1	2	SE	unknown	shelter	90-100	na	8	7
23SR281	700	10	.1	1	S	60	open	50-90	field	7	3
23SR282	710	20	.1	10	open	1,000	open	50-90	field	7	3
23SR283	730	40	.1	2	N	400	open	90-100	field	7	3
23SR284	750	60	.2	2	S	45,000	open	0-10	field	7	3
23SR285	720	30	.1	2	S	140	open	10-50	field	7	3
23SR286	700	10	.1	2	S	525	open	10-50	field	7	3
23SR287	760	70	.2	2	SW	750	open	0-10	field	7	3
23SR288	710	20	.2	2	S	7,000	open	?	field	7	3
23SR298	820	130	.1	1	NE	900	open	50-90	field	7	3
23SR308	700	10	.1	2	SW	30	open	10-50	borrow-area	7	3
23SR309	700	10	.1	2	S	625	open	0-10	borrow-area	7	3
23SR311	790	90	.2	1	open	unknown	open	90-100	field	7	3
23SR312	720	20	.2	2	open	6,000	open	10-50	field	7	2
23SR313	720	20	.3	1	open	1,600	open	50-90	field	7	2
23SR314	720	20	.3	2	open	1,200	open	50-90	field	7	2
23SR315	700	0	.1	2	N	800	open	50-90	field	7	2
23SR316	760	60	.1	1	open	unknown	open	90-100	woods	7	2
23SR317	720	10	.3	1	open	unknown	open	90-100	field	7	2
23SR318	770	80	.2	1	open	unknown	open	90-100	farmyard	7	2
23SR327	720	20	.1	4	open	700	open	50-90	field	8	2
23SR328	730	30	.2	1	open	unknown	open	90-100	pasture	8	2
23SR338	760	70	.1	10	NE	3,000	open	unknown	woods	8	7
23SR339	710	20	.1	10	W	600	open	50-90	woods	8	7
23SR340	720	20	.1	3	NW	500	open	50-90	field	8	7
23SR341	700	0	.1	2	open	300	open	10-50	field	8	7
23SR342	710	10	.2	2	NW	100	open	50-90	field	8	7
23SR343	700	10	.1	10	SE	100	open	90-100	riverbank	8	7
23SR344	710	10	.1	2	W	17,500	open	50-90	field	8	7
23SR345	720	20	.2	2	NW	200	open	50-90	field	8	7
23SR346	720	20	.1	2	open	600	open	10-50	field	8	7
23SR347	710	10	.1	1	SW	5,000	open	50-90	field	8	7
23SR348	710	10	.1	2	N	300	open	0-10	field	8	7

TABLE 4: Continued

Site Data - Stage I Survey Sites

Site No.	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water[1]	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor[2]
23SR349	720	20	.1	10	SW	10,000	open	90-100	woods	8	7
23SR350	700	10	.1	2	W	800	open	10-50	field	8	7
23SR351	710	20	.1	2	N	1,000	open	50-90	field	8	7
23SR352	690	0	.1	3	open	1,200	open	10-50	field	8	7
23SR353	800	10	.2	3	NE	150	open	0-10	field	8	7
23SR354	690	0	.1	3	open	600	open	50-90	field	8	7
23SR355	690	0	.1	3	open	800	open	10-50	field	8	7
23SR356	690	0	.1	3	open	1,200	open	50-90	field	8	7
23SR357	690	10	.1	3	open	300	open	50-90	field	8	7
23SR358	730	40	.1	3	open	500	open	50-90	field	8	7
23SR359	700	10	.1	10	open	100	open	90-100	woods	8	7
23SR360	770	70	.1	10	W	6,000	open	50-90	woods	8	7
23SR362	700	10	.1	10	N	1,300	open	90-100	borrow-area	8	7
23SR363	690	0	.1	10	open	200	open	90-100	field	8	7
23SR364	700	10	.1	3	open	100	open	90-100	field	8	7
23SR365	710	20	.1	2	open	100	open	90-100	waste	8	7
23SR366	700	10	.1	3	open	200	open	50-90	field	8	7
23SR367	780	90	.3	1	open	500	open	90-100	woods	8	7
23SR368	710	20	.1	3	open	60	open	90-100	woods	8	7
23SR369	730	40	.2	1	open	500	open	90-100	pasture	8	7
23SR370	720	30	.1	1	open	500	open	90-100	woods	8	7
23SR387	730	30	.2	1	S	20,000	open	10-50	field	8	7
23SR388	710	10	.1	1	open	400	open	0-10	field	8	7
23SR389	710	10	.1	10	NE	200	open	0-10	field	8	7
23SR390	710	10	.1	10	NE	2,500	open	0-10	field	8	7
23SR391	710	10	.1	10	NE	400	open	0-10	field	8	7
23SR392	710	10	.1	1	S	300	open	0-10	field	8	7
23SR393	710	10	.1	10	S	150	open	0-10	field	8	7
23SR394	710	10	.1	10	S	150	open	0-10	field	8	7
23SR395	710	10	.1	10	S	300	open	0-10	field	8	7
23SR396	710	10	.1	10	S	100	open	0-10	field	8	7
23SR397	720	20	.1	1	S	150	open	0-10	field	8	7
23SR398	710	10	.1	1	S	1,500	open	10-50	field	8	7
23SR399	720	20	.2	1	S	200	open	10-50	field	8	7
23SR400	710	10	.1	2	open	20,000	open	50-90	field	8	7
23SR401	720	20	.2	1	open	400	open	0-10	field	8	7
23SR402	730	30	.4	1	open	100	open	10-50	field	8	7

TABLE 4: Continued

Site Data - Stage I Survey Sites

Site No.	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1)	Rank of Nearest Water[1]	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor[2]
23SR405	730	40	.2	3	open	7,500	open	50-90	woods	7	7
23SR406	820	130	.3	1	open	10,000	open	50-90	woods	7	7
23SR407[5]	770	70	.2	10	S	500	open	90-100	waste	10	4
23SR412[5]	710	10	.1	4	open	4,500	open	0-100	field	10	4
23SR413[5]	730	30	.2	4	open	30	open	0-10	borrow-area	10	4
23SR414[5]	710	10	.1	4	open	1,000	open	0-10	borrow-area	10	4
23SR416[5]	750	50	.3	4	SW	1,500	open	0-10	woods	11	4
Stratum XI - Upper Middle Osage River											
23SR75	690	20	.1	2	open	900	open	0-10	field	7	7
23SR246	750	70	.2	1	open	900	open	10-50	field	7	7
23SR247	740	60	.1	1	N	1,800	open	50-90	field	7	7
23SR248	710	30	.1	10	NW	15,000	open	0-10	field	7	7
23SR249	710	30	.1	10	S	3,600	open	0-10	field	7	7
23SR250	690	30	.2	10	open	4,100	open	10-50	field	7	7
23SR251	710	30	.1	10	N	250	open	0-10	field	7	7
23SR252	730	50	.1	10	NW	250	open	0-10	field	7	7
23SR253	730	50	.1	10	SW	1,200	open	10-50	field	7	7
23SR254	740	60	.1	1	NW	1,000	open	50-90	field	7	5
23SR255	860	190	.2	1	E	600	open	10-50	field	7	5
23SR256	800	130	.3	1	S	5,000	open	10-50	field	7	5
23SR257	680	0	.1	3	open	675	open	0-10	field	7	7
23SR258	680	0	.1	3	W	450	open	0-10	field	7	7
23SR259	680	0	.1	3	W	225	open	0-10	field	7	7
23SR260	690	10	.2	3	W	450	open	0-10	field	7	7
23SR261	700	20		10	W	300	open	90-100	waste	7	7
23SR262	690	10	.1	1	W	unknown	open	50-90	waste	7	7
23SR263	690	10	.1	2	open	1,800	open	0-10	field	7	7
23SR264	690	10	.1	1	W	900	open	0-10	field	7	7
23SR265	690	10	.2	1	W	unknown	open	0-10	field	7	7
23SR266	680	0	.1	10	N	600	open	10-50	pasture	7	5
23SR267	690	0	.1	1	open	300	open	10-50	field	7	3
23SR268	710	30	.2	10	op3n	66,000	open	50-90	woods	7	3
23SR269	690	10	.1	1	E	600	open	90-100	field	7	3
23SR270	720	40	.1	1	E	750	open	90-100	pasture	7	3
23SR271	690	10	.1	10	N	400	open	90-100	woods	7	3
23SR272	720	40	.1	10	S	100	open	0-10	dirt road	7	3

TABLE 4: Continued

Site Data - Stage I Survey Sites

Site No.	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water[1]	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor[2]
23SR273	910	230	.1	1	S	2,000	open	0-10	road	7	3
23SR279	700	20	.1	10	SE	578	open	10-50	field	7	3
23SR280	700	30	.1	10	open	1,000	open	50-90	field	7	3
23SR307	750	80	.1	10	open	120	open	50-90	road	7	3
23SR403	690	20	.1	3	open	375	open	50-90	waste	8	5
23SR404	750	80	.2	1	open	250	open	50-90	field	8	5
Stratum XII - Lower Middle Osage River											
23BE350	680	30	.1	1	SE	1,000	open	10-50	field	7	1
23BE356	680	20	.1	1	S	1,000	open	90-100	field	7	1
23BE357	680	20	.1	1	S	500	open	90-100	field	7	1
23BE359	680	20	.1	1	S	500	open	50-90	field	7	1
23BE367	680	20	.1	10	open	5,000	open	90-100	waste	7	3
23BE368	660	0	.2	10	open	2,000	open	50-90	waste	7	3
23BE369	670	10	.1	10	open	22,000	open	90-100	waste	7	3
23BE370	680	20	.1	10	open	unknown	open	90-100	pasture	7	3
23BE371	690	30	.2	10	open	30,000	open	90-100	waste	7	3
23BE380	690	10	.1	10	S	3,900	open	50-90	waste	7	1
23BE381	690	30	.1	2	SE	3,000	open	50-90	waste	7	1
23SR238	680	20	.1	2	E	2,500	open	0-10	field	7	7
23SR239	690	30	.1	2	E	900	open	50-90	waste	7	7
23SR240	680	20	.1	2	open	25,000	open	0-10	field	7	7
23SR241	670	10	.1	2	open	15,750	open	50-90	field	7	7
23SR242	710	50	.1	1	open	8,000	open	0-10	field	7	7
23SR243	690	30	.1	2	open	900	open	0-10	field	7	7
23SR244	750	90	.2	2	open	600	open	0-10	field	7	7
23SR245	750	80	.1	10	NW	400	open	90-100	field	7	7
Stratum XIII - Lower Osage River											
23BE313	670	30	.1	10	S	300	open	0-10	field	7	1
23BE314	660	20	.1	10	SW	300	open	0-10	field	7	1
23BE315	670	10	.1	10	SW	1,000	open	0-10	field	7	1
23BE316	670	30	.1	10	SW	600	open	0-10	field	7	1
23BE317	670	30	.1	10	S	12,000	open	0-10	field	7	1
23BE328	660	20	.1	10	open	2,190	open	0-10	field	7	7
23BE329	670	30	.1	10	open	1,650	open	0-10	field	7	7
23BE332	720	70	.2	1	E	1,000	open	90-100	waste	7	1
23BE333	660	20	.1	1	open	3,000	open	10-50	field	7	1
23BE334	660	20	.1	1	W	500	open	50-90	field	7	1

TABLE 4: Continued

Site Data - Stage I Survey Sites

Site No.	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water[1]	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor[2]
23BE344	690	50	.1	1	W	3,000	open	50-90	field	7	1
23BE345	680	40	.1	1	W	4,000	open	50-90	field	7	1
23BE346	660	20	.1	10	open	30,000	open	50-90	field	7	1
23BE347	660	20	.1	10	open	10,000	open	50-90	field	7	1
23BE348	680	40	.1	10	W	1,000	open	50-90	field	7	1
23BE349	700	60	.1	10	W	1,000	open	50-90	field	7	1
23BE351	680	40	.1	1	W	2,500	open	90-100	field	7	3
23BE352	690	50	.1	1	W	unknown	open	90-100	field	7	3
23BE353	700	60	.1	1	W	unknown	open	90-100	field	7	3
23BE354	700	60	.1	1	W	unknown	open	90-100	field	7	3
23BE372	660	10	.1	10	open	3,750	open	50-90	field	7	5
23BE373	670	20	.2	10	open	5,000	open	90-100	field	7	5
23BE374	680	30	.3	10	open	70	open	90-100	field	7	3
23BE375	660	10	.1	10	E	15,883	open	90-100	pasture	7	3
23BE383	660	10	.1	1	open	2,500	open	90-100	waste	7	1
23BE443	780	130	.1	1	N	unknown	open	50-90	field	8	4
Stratum XIV - Little Tebo Creek											
23BE387	680	30	.1	4	open	2,000	open	90-100	field	7	3
23BE388	690	40	.1	2	open	10,000	open	90-100	field	7	3
23BE389	690	40	.1	2	SE	2,800	open	90-100	field	7	3
23BE390	690	40	.1	2	SE	73,000	open	50-90	field	7	3
23BE391	690	40	.1	2	SE	unknown	open	50-90	field	7	3
23BE392	690	40	.1	4	open	400	open	90-100	field	7	3
23BE393	720	70	.1	1	E	3,000	open	90-100	field	7	3
23BE394	740	90	.2	1	SE	300	open	50-90	field	7	3
23BE395	710	60	.1	2	SW	100	open	90-100	?	7	3
23BE396	750	100	.1	3	SW	300	open	90-100	pasture	7	3
23BE461[5]	690	40	.1	4	open	200	open	50-90	waste	10	6
23BE462[5]	700	50	.1	4	N	50	open	10-50	waste	10	6
Stratum XV - Lower Tebo Creek											
23BE384	700	50	.2	5	S	1,000	open	90-100	waste	7	1
23BE385	680	30	.1	5	S	5,000	open	90-100	waste	7	1
23BE386	690	40	.1	3	S	300	open	10-50	field	7	1
23BE397	690	40	.1	5	open	3,000	open	50-90	woods	7	1
23BE398	690	40	.1	5	S	1,000	open	50-90	woods	7	1
23BE399	690	40	.1	5	NW	1,000	open	50-90	woods	7	1
23BE400	680	30	.1	5	SW	5,000	open	50-90	field	7	1

TABLE 4: Continued

Site Data - Stage I Survey Sites

Site No.	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water[1]	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor[2]
23BE401	790	140	.1	3	open	70	mound	90-100	waste	7	1
23BE402	670	20	.2	3	SE	1,500	open	90-100	pasture	7	1
23BE403	740	90	.1	5	N	4,000	open	50-90	pasture	7	1
23BE421	660	10	.1	5	SW	10,000	open	90-100	woods	8	3
Stratum XVI - Upper Tebo Creek											
23HE167	690	30	.1	3	NW	1,000	open	50-90	pasture	7	1
23HE168	670	10	.1	5	NE	3,000	open	90-100	waste	7	1
23HE169	670	10	.1	3	W	4,000	open	90-100	waste	7	1
23HE170	700	40	.1	3	W	5,000	open	10-50	pasture	7	1
23HE171	690	30	.1	3	S	900	open	50-90	pasture	7	1
23HE172	720	60	.1	3	SE	1,050	open	50-90	pasture	7	1
23HE173	690	30	.1	3	open	450	open	50-90	pasture	7	1
23HE174	690	30	.1	3	open	500	open	50-90	woods	7	1
23HE175	700	20	.1	3	open	250	open	50-90	woods	7	1
23HE176[5]	690	30	.1	5	NE	1,500	open	50-90	pasture	7	1
23HE177[5]	690	30	.1	5	N	1,000	open	50-90	pasture	7	1
23HE178	690	30	.1	2	open	1,000	open	10-50	field	7	1
23HE179	720	60	.1	2	NW	3,000	open	90-100	waste	7	1
23HE189	690	30	.1	2	E	unknown	open	10-50	field	7	1
23HE190	720	60	.3	5	NE	5,000	open	50-90	waste	7	1
23HE191	690	30	.1	5	NW	2,000	open	90-100	waste	7	1
23HE192	710	50	.1	5	N	400	open	50-90	pasture	7	1
23HE285[5]	720	60	.2	5	open	3,000	open	?	?	10	5
23HE286[5]	710	50	.2	1	open	300	open	50-90	?	10	5
23HE287[5]	690	30	.1	1	S	300	open	50-90	woods	10	5
23HE288[5]	690	0	.1	5	open	300	open	10-50	woods	10	5
23HE305	700	40	.1	5	N	1,250	open	50-90	pasture	11	5
23HE306	700	40	.1	5	N	1,800	open	90-100	pasture	11	5
23HE307	700	40	.1	5	NW	900	open	50-90	pasture	11	5
23HE308	690	30	.1	5	W	1,250	open	90-100	pasture	11	5
23HE309	740	80	.1	5	E	525	open	50-90	pasture	11	5
Stratum XVII - Lower South Grand River											
23BE415	650	0	.1	10	open	3,000	open	10-50	field	7	3
23BE416	660	10	.1	2	SE	1,250	open	10-50	field	7	3
23BE417	660	10	.1	10	open	6,300	open	10-50	field	7	3
23BE418	680	30	.2	10	open	625	open	10-50	field	7	3
23BE419	700	50	.2	1	open	60	open	50-90	unknown	7	3

TABLE 4: Continued

Site Data - Stage I Survey Sites

Site No.	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water[1]	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor[2]
23BE420	690	40	.1	1	SW	1,875	open	90-100	pasture	7	3
23BE422	680	30	.1	10	NE	300	open	90-100	waste	8	3
23BE423	660	10	.1	10	open	20	open	50-90	waste	8	3
23BE424	660	10	.1	10	open	12,000	open	50-90	waste	8	3
23BE425	680	30	.1	10	SE	2,500	open	50-90	waste	8	3
23BE427	670	20	.2	10	open	625	open	50-90	?	8	3
23BE428	670	20	.1	10	W	100	open	0-10	?	8	3
23BE429	670	20	.2	10	open	900	open	unknown	?	8	3
23BE430	670	20	.2	10	open	5,000	open	50-90	?	8	3
23BE431	670	20	.1	2	open	616	open	90-100	?	8	3
23BE432	670	10	.1	10	open	10,000	open	90-100	pasture	8	3
23BE433	750	90	.1	2	open	1,000	open	90-100	pasture	8	3
23BE435	660	10	.3	2	open	70	open	50-90	field	8	3
23BE436	770	130	.1	10	open	1,056	open	90-100	?	8	3
23BE437	670	20	.1	10	open	100	open	90-100	pasture	8	3
23BE438	680	30	.1	10	open	2,500	open	90-100	woods	8	3
23BE439	680	30	.2	10	SE	1,000	open	90-100	pasture	8	3
23BE440	660	10	.1	10	open	400	open	90-100	pasture	8	3
23BE441	660	10	.1	10	open	50	open	90-100	pasture	8	3
23BE442	660	10	.1	1	open	unknown	open	90-100	pasture	8	3
23BE444	700	30	.2	1	open	unknown	open	50-90	waste	8	4
23BE446	680	20	.1	9	E	80	shelter	10-50	woods	8	2
23BE448	660	10	.1	10	NW	unknown	open	90-100	pasture	8	3
23BE449	670	20	.1	10	open	500	open	90-100	pasture	8	3
23BE450	730	80	.1	1	open	7,500	open	90-100	pasture	8	3
23BE451	730	80	.1	1	open	400	open	90-100	pasture	8	3
23BE452	670	20	.1	1	W	10,000	open	50-90	field	8	3
23BE455	670	20	.1	1	open	unknown	open	50-90	field	8	3
Stratum XVIII - Middle South Grand River											
23HE212	690	10	.1	10	open	525	open	10-50	field	7	5
23HE213	750	70	.2	1	open	unknown	open	50-90	pasture	7	5
23HE22[illegible]	680	0	.1	3	S	525	open	0-10	field	7	5
23HE22[illegible]	690	10	.1	3	S	1,000	open	0-10	field	7	5
23HE224	690	10	.1	3	SW	1,000	open	0-10	field	7	5
23HE225	690	10	.1	3	SW	800	open	0-10	field	7	5
23HE226	700	20	.1	3	W	600	open	0-10	field	7	5
23HE227	690	10	.1	3	W	100	open	0-10	field	7	5

TABLE 4: Continued

Site Data - Stage I Survey Sites

Site No.	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water[1]	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor[2]
23HE228	690	10	.1	3	W	1,050	open	0-10	field	7	5
23HE244	720	40	.1	3	S	450	open	0-10	field	7	5
23HE245	720	40	.1	3	SW	600	open	0-10	field	7	5
23HE246	710	30	.1	3	SW	450	open	50-90	field	7	5
23HE298	690	20	.2	10	NE	90	open	90-100	woods	10	5
23HE299	690	20	.1	10	NE	45	open	90-100	?	10	5
23HE300	700	30	.2	10	open	60	open	90-100	woods	10	5
23HE301	700	30	.2	10	NE	50	open	90-100	woods	10	5
23HE302	700	30	.1	10	open	225	open	90-100	woods	10	5
23HE303	710	40	.1	10	S	270	open	90-100	woods	10	5
23HE304	690	20	.1	10	S	200	open	90-100	woods	10	5
Stratum XIX - Confluence Area											
23HE9	700	10	.1	10	S	5,625	open	50-90	field	8	5
23HE119	700	10	.3	10	SE	60	open	90-100	waste	7	5
23HE122	690	10	.1	10	S	600	open	0-10	field	7	5
23HE229	680	0	.1	1	NE	1,200	open	50-90	?	7	5
23HE230	700	20	.1	1	NW	175	open	90-100	?	7	5
23HE238	700	20	.1	10	W	450	open	0-10	field	7	5
23HE239	700	20	.1	10	NW	1,500	open	50-90	field	7	5
23HE240	690	0	.1	1	E	1,500	open	0-10	field	7	5
23HE241	690	0	.1	1	E	255	open	0-10	field	7	5
23HE242	690	10	.1	10	E	600	open	0-10	field	7	5
23HE243	690	10	.1	2	S	1,200	open	10-50	field	7	5
23HE247	690	10	.1	10	SE	700	open	10-50	field	7	5
23HE248	680	0	.1	10	S	1,000	open	50-90	field	7	5
23HE249	680	0	.1	10	S	150	open	50-90	field	7	5
23HE250	750	60	.1	10	SW	600	open	50-90	woods	7	5
23HE251	700	10	.1	10	N	600	open	50-90	woods	7	5
23HE256	700	10	.1	10	N	1,800	open	10-50	woods	8	5
23HE258	700	10	.2	10	open	1,250	open	0-10	field	8	5
23HE279[5]	700	20	.3	10	NE	3,250	open	10-50	field	8	5
23HE294	730	40	.1	10	SE	2,295	open	0-10	field	10	5
23HE295	720	30	.2	10	SE	250	open	0-10	field	10	5
23HE310	710	20	.1	10	N	50,000	open	0-10	field	10	5
23HE342	700	20	.1	10	W	30,000	open	10-50	field	12	8
23HE343	690	10	.1	10	W	4,000	open	10-50	field	12	8
23HE395	700	10	.1	10	E	40,000	open	10-50	field	10	8

TABLE 4: Continued

Site Data - Stage I Survey Sites

Site No.	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water[1]	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor[2]
23HE396	700	20	.2	5	open	40,000	open	10-50	field	10	8
23HE404	740	50	.5	10	W	4,000	open	90-100	woods	3	8
23HE405	710	0	.1	2	open	2,500	open	10-50	field	3	8
23HE428	740	50	.2	1	W	8,000	open	90-100	waste	2	8
23HE429	730	40	.2	3	SW	70,000	open	90-100	field	2	8
23HE433	710	20	.3	4	N	15,000	open	90-100	field	2	8
23HE458	710	20	.1	1	N	80,000	open	90-100	field	4	8
23HE459	720	30	.1	10	SE	30,000	open	90-100	field	4	8
23HE464	700	10	.1	10	W	5,000	open	0-10	field	5	8
23HE465	710	20	.2	10	W	9,000	open	0-10	field	5	8
23HE466	700	10	.2	10	W	4,000	open	0-10	field	5	8
23HE467	700	10	.1	10	W	20,000	open	0-10	field	5	8
23HE468	710	20	.1	10	W	4,000	open	0-10	field	5	8
23HE469	700	10	.1	3	N	18,000	open	0-10	field	5	8
23HE470	700	10	.1	1	N	3,000	open	0-10	field	5	8
23HE471	710	20	.2	1	N	3,000	open	0-10	field	5	8
23HE472	740	50	.1	3	SW	6,000	open	90-100	woods	5	8
23HE474	720	20	.1	4	open	8,000	open	0-10	field	5	8
23HE483	750	60	.3	10	E	4,000	open	0-10	field	5	8
23HE484	730	40	.6	1	W	6,000	open	50-90	woods	5	8
23HE485	680	0	.1	10	SE	20,000	open	0-10	field	6	8
23HE486	690	10	.1	10	NW	2,000	open	0-10	field	6	8
23HE487	700	20	.1	10	SE	3,000	open	0-10	field	6	8
23HE559	730	40	.3	1	N	9,000	open	50-90	woods	8	8
23HE560	750	60	.3	3	N	4,000	open	90-100	woods	8	8
23HE561	720	30	.1	10	N	5,000	open	90-100	woods	8	8
23HE562	710	20	.1	10	N	20,000	open	90-100	woods	8	8
23HE563	750	60	.1	1	W	5,000	open	90-100	woods	8	8
23HE565	680	0	.1	10	S	15,000	open	90-100	pasture	9	8
Stratum XX - Upper South Grand River											
23HE8	710	20	.1	2	open	35,000	open	50-90	field	10	8
23HE14	700	0	.1	10	open	5,000	open	90-100	unknown	10	8
23HE16	730	30	.2	1	open	2,000	open	10-50	field	12	8
23HE17	730	30	.2	2	open	10,000	open	90-100	pasture	10	8
23HE114	740	50	.2	2	open	1,000	open	50-90	field	7	5
23HE116	700	10	.1	3	open	30,000	open	10-50	field	10	8
23HE117	720	40	.1	3	open	3,600	open	50-90	field	7	5

TABLE 4: Continued

Site Data - Stage I Survey Sites

Site No.	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water[1]	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor[2]
23HE126	750	50	.5	3	open	25,000	open	90-100	?	11	8
23HE131	710	10	.1	2	open	5,000	open	90-100	?	1	8
23HE180	720	30	.1	10	W	13,500	open	50-90	field	7	7
23HE181	720	30	.1	10	W	80	open	90-100	?	7	7
23HE182	720	20	.2	2	NE	80	open	90-100	?	7	7
23HE183[5]	710	10	.1	2	W	200	open	90-100	?	7	7
23HE184[5]	700	0	.1	10	S	9,500	open	50-90	?	7	7
23HE231	740	20	.1	2	SE	unknown	open	unknown	field	7	7
23HE232	750	30	.1	2	NW	unknown	open	unknown	field	7	7
23HE233	750	30	.2	1	N	unknown	open	unknown	field	7	7
23HE234	780	60	.2	10	open	2,100	open	50-90	field	7	7
23HE217	720	10	.1	2	SE	150	open	10-50	field	7	7
23HE218	720	10	.2	2	SE	300	open	10-50	field	7	7
23HE219	720	10	.1	2	S	200	open	0-10	field	7	7
23HE220	720	10	.1	1	NW	100	open	0-10	?	7	7
23HE252	770	80	.1	1	open	800	open	10-50	field	7	5
23HE253	710	20	.1	3	N	750	open	50-90	field	7	5
23HE254	710	20	.1	3	SE	900	open	50-90	field	8	5
23HE257	710	20	.2	10	W	60	open	50-90	field	8	5
23HE277[5]	710	10	.1	10	N	2,400	open	50-90	field	8	5
23HE278[5]	720	20	.2	2	NE	510	open	0-10	?	8	5
23HE283[5]	740	50	.1	3	open	300	open	0-10	?	10	5
23HE284[5]	720	30	.1	3	open	200	open	50-90	?	10	5
23HE311	720	20	.2	2	open	3,000	open	90-100	field	10	8
23HE326	700	10	.1	10	open	25,000	open	10-50	field	12	8
23HE328	710	20	.1	3	open	6,000	open	90-100	pasture	12	8
23HE329	705	15	.1	3	open	5,000	open	10-50	field	12	8
23HE330	730	40	.2	3	open	9,000	open	unknown	unknown	12	8
23HE331	710	20	.1	3	open	15,000	open	10-50	field	12	8
23HE332	710	20	.1	3	open	3,000	open	10-50	field	12	8
23HE333	705	15	.1	3	open	70,000	open	10-50	field	12	8
23HE334	700	10	.1	3	open	4,000	open	50-90	field	12	8
23HE335	730	30	.2	2	open	9,000	open	50-90	field	12	8
23HE336	730	30	.2	2	open	6,000	open	90-100	pasture	1	8
23HE337	715	15	.1	1	open	20,000	open	10-50	field	1	8
23HE338	720	20	.1	1	open	25,000	open	50-90	field	12	8
23HE339	720	20	.2	3	open	15,000	open	10-50	?	12	8

TABLE 4: Continued

Site Data - Stage I Survey Sites

Site No.	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water[1]	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor[2]
23HE340	715	15	.5	3	open	8,000	open	90-100%	pasture	12	8
23HE347	785	85	.2	1	open	13,000	open	0-10	field	12	8
23HE348	740	40	.1	2	open	10,000	open	50-90	field	12	8
23HE349	720	20	.2	10	open	9,000	open	unknown	field	12	8
23HE350	715	25	.1	3	open	16,000	open	10-50	field	12	8
23HE351	710	20	.1	3	open	2,000	open	unknown	field	12	8
23HE352	740	50	.1	3	open	6,000	open	10-50	field	12	8
23HE353	710	20	.1	3	open	5,000	open	10-50	field	12	8
23HE360	720	20	.1	1	open	5,000	open	50-90	field	1	8
23HE361	710	20	.1	10	open	25,000	open	90-100	?	1	8
23HE362	730	40	.2	1	open	4,000	open	10-50	field	1	8
23HE363	705	15	.1	3	open	4,000	open	10-50	field	1	8
23HE365	725	35	.1	1	open	6,000	open	90-100	pasture	1	8
23HE366	710	20	.1	3	open	5,000	open	0-10	field	1	8
23HE367	710	20	.3	3	open	20,000	open	0-10	field	1	8
23HE368	725	25	.1	3	open	30,000	open	90-100	pasture	1	8
23HE369	710	10	.1	3	open	5,000	open	90-100	pasture	1	8
23HE370	710	10	.1	3	open	10,000	open	90-100	pasture	1	8
23HE371	710	10	.1	3	open	8,000	open	90-100	pasture	1	8
23HE372	710	20	.1	3	open	5,000	open	50-90	field	1	8
23HE373	730	30	.2	2	open	7,000	open	50-90	field	1	8
23HE378	695	5	.1	10	open	5,000	open	90-100	waste	11	8
23HE379	730	40	.1	10	open	18,000	open	50-90	field	11	8
23HE380	750	60	.2	10	open	18,000	open	50-90	field	11	8
23HE381	735	45	.1	10	open	15,000	open	50-90	waste	11	8
23HE382	710	10	.3	10	open	8,000	open	50-90	field	11	8
23HE383	710	10	.1	10	open	6,000	open	50-90	field	11	8
23HE384	710	10	.3	10	open	8,000	open	50-90	field	11	8
23HE385	710	10	.1	2	open	20,000	open	unknown	field	11	8
23HE386	720	20	.2	10	open	7,000	open	50-90	field	11	8
23HE387	720	20	.2	10	open	5,000	open	90-100	pasture	11	8
23HE388	720	20	.1	2	open	2,000	open	90-100	field	11	8
23HE389	725	25	.2	2	open	3,000	open	50-90	field	11	8
23HE390	7[illegible]	10	.3	2	open	20,000	open	10-50	?	11	8
23HE391	710	10	.1	2	open	25,000	open	50-90	field	11	8
23HE392	720	20	.2	1	open	4,000	open	10-50	field	11	8
23HE393	700	10	.1	3	open	3,000	open	10-50	field	12	8

TABLE 4: Continued

Site Data - Stage I Survey Sites

Site No.	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water[1]	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor[2]
23HE394	705	15	.1	3	open	4,000	open	10-50	field	12	8
23HE401	720	30	.1	3	open	6,000	open	50-90	field	3	8
23HE402	715	25	.1	3	open	6,000	open	50-90	field	3	8
23HE403	730	40	.2	3	open	unknown	open	50-90	field	3	8
23HE426	700	10	.1	3	open	8,000	open	0-10	field	2	8
23HE427	705	15	.1	3	open	9,000	open	0-10	field	2	8
23HE434	710	20	.1	3	open	7,000	open	50-90	field	2	8
23HE435	700	10	.1	3	open	11,000	open	50-90	field	2	8
23HE436	705	15	.1	4	open	3,000	open	50-90	field	2	8
23HE437	710	20	.1	4	open	5,000	open	50-90	field	2	8
23HE438	715	15	.1	2	open	6,000	open	10-50	field	3	8
23HE475	700	10	.1	3	open	2,000	open	0-10	field	5	8
23HE476	710	20	.1	3	open	3,000	open	0-10	field	5	8
23HE477	710	20	.1	3	open	12,000	open	0-10	field	5	8
23HE478	710	20	.2	3	open	15,000	open	0-10	field	5	8
23HE479	710	20	.12	3	open	3,000	open	0-10	field	5	8
23HE480	705	15	.2	3	open	18,000	open	0-10	field	5	8
23HE564	755	65	.2	1	open	12,000	open	50-90	field	9	8
Stratum XXI - Deepwater Creek											
23HE10	710	10	.1	1	open	9,000	open	10-50	field	11	8
23HE11	710	10	.1	5	open	2,000	open	unknown	waste	11	8
23HE13	710	20	.1	3	open						
23HE15	740	40	.1	5	open	20,000	open	0-10	field	10	8
23HE123	740	50	.1	5	open	4,000	open	50-90	pasture	10	8
23HE124	720	30	.1	5	open	30,000	open	10-50	field	10	8
23HE185	720	20	.1	4	open	1,500	open	10-50	field	7	7
23HE186	720	20	.1	4	open	700	open	0-10	field	7	7
23HE187	720	20	.1	4	open	1,250	open	0-10	field	7	7
23HE188	720	20	.1	4	S	250	open	0-10	field	7	7
23HE193	720	20	.1	4	W	60	open	90-100	woods	7	7
23HE194	720	20	.1	4	open	1,500	open	0-10	?	7	7
23HE195	720	20	.1	4	W	1,200	open	50-90	?	7	7
23HE196	710	10	.1	5	open	250	open	0-10	field	7	7
23HE197	710	10	.1	5	open	150	open	0-10	field	7	7
23HE198	710	10	.2	5	open	1,000	open	0-10	field	7	7
23HE199	710	10	.2	1	SW	unknown	open	0-10	field	7	7

TABLE 4: Continued

Site Data - Stage I Survey Sites

Site No.	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water[1]	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor[2]
23HE200	710	10	.1	5	open	600	open	0-10	field	7	7
23HE201	710	10	.1	1	open	3,800	open	0-10	field	7	7
23HE202	710	10	.1	1	open	1,200	open	0-10	field	7	7
23HE203	710	10	.1	1	open	1,200	open	10-50	field	7	7
23HE204	720	30	.1	4	open	200	open	50-90	field	7	7
23HE205	720	30	.1	4	open	100	open	50-90	field	7	7
23HE206	720	30	.1	4	open	200	open	50-90	field	7	7
23HE207	720	30	.1	4	open	200	open	50-90	field	7	7
23HE208	720	30	.1	4	open	300	open	50-90	field	7	7
23HE209	720	30	.1	1	open	1,200	open	50-90	field	7	7
23HE210	730	30	.2	5	NE	100	open	10-50	field	7	7
23HE211	730	30	.1	5	N	3,000	open	10-50	field	7	7
23HE214	700	10	.1	1	open	400	open	0-10	field	7	7
23HE215	720	30	.1	1	S	180	open	90-100	field	7	7
23HE216	700	10	.1	5	open	150	open	10-50	field	7	7
23HE221	720	20	.1	5	open	100	open	0-10	field	7	7
23HE259	730	40	.2	1	E	1,000	open	50-90	pasture	8	5
23HE260	710	20	.1	1	W	525	open	50-90	woods	8	5
23HE261	700	10	.1	5	W	7,500	open	50-90	pasture	8	5
23HE262	690	0	.1	5	open	400	open	50-90	?	8	5
23HE263	690	0	.1	5	open	600	open	0-10	field	8	5
23HE264	690	0	.1	5	open	400	open	0-10	field	8	5
23HE265	700	10	.1	5	open	700	open	0-10	field	8	5
23HE274	700	0	.1	5	open	2,400	open	0-10	waste	8	5
23HE275	690	0	.1	5	open	100	open	10-50	field	8	5
23HE276	730	20	.1	5	SE	100	open	50-90	field	8	7
23HE280	720	20	.1	4	open	150	open	50-90	field	8	7
23HE281	690	0	.3	5	open	700	open	50-90	field	8	5
23HE289[5]	710	20	.1	4	open	75	open	0-10	?	10	5
23HE290[5]	710	20	.1	4	S	75	open	10-50	?	10	5
23HE291[5]	710	20	.1	3	W	250	open	10-50	woods	10	5
23HE292[5]	720	30	.1	3	W	50	open	50-90	woods	10	5
23HE293[5]	710	20	.1	4	open	125	open	50-90	woods	10	5
23HE296[5]	730	40	.1	5	E	150	open	90-100	woods	10	5
23HE297	740	50	.2	5	open	150	open	90-100	woods	10	5
23HE313	705	15	.1	4	open						

TABLE 4: Continued

Site Data - Stage I Survey Sites

Site No.	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water[1]	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor[2]
23HE315	720	20	.1	2	open	6,000	open	50-90%	?	10	8
23HE316	730	40	.1	1	open	15,000	open	50-90	field	10	8
23HE317	720	30	.1	5	open	20,000	open	50-90	field	10	8
23HE318	740	50	.1	5	open	5,000	open	10-50	field	10	8
23HE319	710	10	.1	5	open	15,000	open	50-90	field	10	8
23HE320	740	40	.1	1	open	10,000	open	90-100	pasture	1	8
23HE321	730	40	.1	1	open	15,000	open	10-50	field	11	8
23HE322	730	30	.1	1	open	unknown	open	unknown	waste	11	8
23HE323	740	40	.1	5	open	15,000	open	50-90	field	11	8
23HE324	735	35	.1	5	open	20,000	open	10-50	field	11	8
23HE325	730	30	.1	5	open	6,000	open	50-90	field	11	8
23HE345	695	5	.1	5	open	20,000	open	10-50	field	12	8
23HE346	700	10	.1	4	open	30,000	open	10-50	field	12	8
23HE355	720	20	.1	2	open	10,000	open	50-90	field	1	8
23HE356	725	25	.1	5	open	10,000	open	50-90	field	1	8
23HE374	735	35	.1	5	open	50,000	open	10-50	field	11	8
23HE375	715	15	.1	5	open	6,000	open	50-90	field	11	8
23HE376	715	15	.1	1	open	8,000	open	50-90	pasture	11	8
23HE377	720	30	.1	5	open	12,000	open	50-90	field	11	8
23HE399	720	20	.1	2	open	8,000	open	unknown	?	10	8
23HE406	735	35	.1	4	open	6,000	open	50-90	field	3	8
23HE407	705	5	.1	4	open	4,000	open	50-90	field	3	8
23HE408	720	30	.1	4	open	10,000	open	50-90	field	3	8
23HE409	720	20	.1	4	open	5,000	open	90-100	field	3	8
23HE410	710	10	.1	4	open	2,000	open	50-90	field	3	8
23HE411	715	15	.1	4	open	12,000	open	10-50	field	3	8
23HE412	420	30	.1	4	open	10,000	open	50-90	field	3	8
23HE413	725	25	.1	2	open	4,000	open	90-100	woods	3	8
23HE414	720	20	.1	4	open	3,000	open	90-100	?	3	8
23HE415	715	15	.1	4	open	5,000	open	90-100	?	3	8
23HE416	720	20	.1	4	open	6,000	open	90-100	pasture	3	8
23HE417	735	35	.1	1	open	5,000	open	50-90	waste	2	8
23HE418	740	50	.1	1	open	20,000	open	10-50	field	2	8
23HE419	720	20	.1	4	open	12,000	open	10-50	field	2	8
23HE420	730	40	.1	4	open	20,000	open	10-50	field	2	8

TABLE 4: Continued

Site Data - Stage I Survey Sites

Site No.	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water[1]	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor[2]
23HE421	720	20	.1	4	open	3,000	open	90-100	field	2	8
23HE422	715	15	.1	4	open	1,500	open	90-100	waste	2	8
23HE423	710	10	.2	1	open	1,500	open	10-50	field	2	8
23HE424	705	15	.3	2	open	7,000	open	10-50	field	2	8
23HE425	735	35	.1	1	open	8,000	open	90-100	pasture	2	8
23HE439	710	10	.1	5	open	4,000	open	10-50	field	3	8
23HE440	715	15	.1	5	open	4,000	open	50-90	field	3	8
23HE444	695	5	.1	4	open	4,000	open	50-90	field	3	8
23HE445	695	5	.1	5	open	5,000	open	10-50	field	3	8
23HE446	695	5	.1	4	open	3,000	open	10-50	field	3	8
23HE447	695	5	.1	1	open	2,500	open	10-50	field	4	8
23HE448	705	15	.1	1	open	25,000	open	90-100	pasture	4	8
23HE449	700	10	.1	1	open	25,000	open	90-100	pasture	4	8
23HE450	700	10	.1	1	open	2,500	open	90-100	woods	4	8
23HE451	705	15	.1	5	open	10,000	open	90-100	waste	4	8
23HE456	725	25	.1	4	open	3,000	open	90-100	waste	2	8
23HE457	720	20	.1	3	open	2,000	open	50-90	?	2	8
23HE460	730	30	.1	1	open	3,000	open	0-10	field	5	8
23HE461	740	40	.1	1	open	6,000	open	0-10	field	5	8
23HE473	750	60	.2	4	open	3,000	open	0-10	field	5	8
23HE488	720	20	.1	5	open	3,500	open	10-50	field	7	8
23HE489	710	10	.1	1	open	2,000	open	10-50	field	7	8
23HE400	740	40	.1	5	open	18,000	open	10-50	field	10	8
Stratum XXII - Cooper's Creek											
23HE255	700	10	.1	4	open	1,800	open	50-90	field	8	5
23HE266	690	0	.1	4	open	2,000	open	0-10	field	8	5
23HE267	690	0	.1	4	E	90	open	0-10	field	8	5
23HE268	690	0	.1	1	SW	300	open	0-10	field	8	5
23HE269	700	10	.1	4	open	525	open	10-50	field	8	5
23HE270	700	10	.1	4	open	200	open	10-50	field	8	5
23HE271	700	10	.1	4	SE	200	open	0-10	field	8	5
23HE272	690	0	.1	4	open	900	open	0-10	field	8	5
23HE273	690	0	.1	4	open	4,400	open	10-50	field	8	5
23HE282	700	10	.2	5	open	200	open	10-50	field	8	5
23HE314	700	10	.1	4	open	2,000	open	10-50	field	10	8
23HE344	695	5	.1	4	open	5,000	open	10-50	field	12	8
23HE397	720	30	.1	1	open	5,000	open	90-100	pasture	10	8
23HE398	710	20	.1	1	open	8,000	open	50-90	pasture	10	8

TABLE 4: Continued

Site Data - Stage I Survey Sites

Site No.	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water[1]	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor[2]
23HE441	695	5	.1	1	open	2,000	open	10-50	field	3	8
23HE442	695	5	.1	1	open	10,000	open	10-50	field	3	8
23HE443	695	5	.1	4	open	4,000	open	10-50	field	3	8
23HE452	710	20	.1	1	open	3,000	open	50-90	field	4	8
23HE453	710	20	.1	1	open	20,000	open	10-50	waste	4	8
23HE454	705	15	.1	4	open	5,000	open	50-90	field	4	8
23HE455	740	50	.1	4	open	8,000	open	90-100	woods	4	8
23HE549	730	40	.1	4	open	10,000	open	10-50	field	10	8
23HE550	740	50	.1	4	open	15,000	open	0-10	field	10	8
23HE551	740	50	.1	4	open	5,000	open	0-10	field	10	8
23HE552	750	60	.1	4	open	10,000	open	50-90	field	10	8
23HE553	760	70	.1	4	open	12,000	open	90-100	woods	10	8
23HE554	740	50	.1	4	open	6,000	open	90-100	pasture	10	8
23HE555	740	50	.1	4	open	15,000	open	90-100	woods	10	8
23HE320	740	40	.1	1	open	10,000	open	90-100	pasture	11	8
23HE556	750	60	.1	4	open	3,000	open	50-90	field	11	8
23HE557	760	70	.1	4	open	5,000	open	unknown	woods	11	8
23HE558	750	60	.2	2	open	1,000	open	50-90	field	11	8
23HE566	700	10	.1	4	open	2,000	open	50-90	pasture	10	8
23HE567	705	5	.1	1	open	10,000	open	90-100	woods	10	8
23HE568	710	20	.1	4	open	15,000	open	50-90	pasture	10	8
23HE569	720	30	.1	4	open	5,000	open	90-100	woods	10	8
23HE12	710	20	.1	4	open	15,000	open	50-90	field	10	8
23HE570	720	30	.1	4	open	7,000	open	50-90	field	10	8
23HE571	735	45	.1	2	open	5,000	open	90-100	woods	10	8

FOOTNOTES:

1. Ranking done on U.S.G.S. 7.5' quadrangle sheets.
2. Surveyors names are not listed.
3. Site is also included in report for Purchase Order DACW41-75-M-2065 (Roper 1976a).
4. Tested during period of survey, see other volumes in this report for more information.
5. Site is in road relocation or borrow pit and is also included in report for Purchase Order DACW41-75-M-1854 (Roper 1975c).

the Truman Reservoir survey records in the American Archaeology Division of the University of Missouri-Columbia, with the Archaeological Survey of Missouri, with the Office of Historic Preservation, and with the Interagency Archeological Services-Denver. Although the area was not stratified for sampling purposes until Stage II, the strata designed at that time are employed here for these tables to help organize the data. A summary tabulation of sites listed by stratum is given (Table 5).

This initial tabulation uses a simple tripartite division of types of sites, viz., open, shelter or cave, and mound or cairn. Of the 887 sites, 873 (98.4%) were open sites, 13 were shelters (1.5%), while only a single mound (0.1%) was recorded. The small number of shelters and mounds is probably attributable to several factors: (1) survey concentrated on open fields, which would obviously reduce the number of shelters recorded, (2) a shelter was not recorded and assigned a site number unless it was reasonably certain it contained cultural material, (3) mounds are frequently on high ground and are often outside the reservoir acquisition boundaries, and (4) many mounds are difficult to recognize because of low profiles and/or destruction (although the old adage that a mound is easily recognized by the pot-hole in its center is sadly true in the Truman Reservoir area).

The extent of the concentration on fields is revealed by examining the frequency distribution of the ground cover variable. About two-thirds of the sites recorded during Stage I survey were in plowed fields (593 of 887 = 66.9%). The other third of the sites were accounted for by pasture (n = 96, 10.8%), woods (n = 80, 9.0%), abandoned farmland (n = 44, 5.0%); and miscellaneous

TABLE 5

Summary of Stage I Survey

Stratum No.	Open	No. of Sites Shelter	Mound	No. Previously Recorded	No. in Borrow Area/ Relocation	Site Numbers
1	62	5	0	0	1	HI223-HI258, HI260-HI261, HI263-HI265, BE195-BE197, BE254, BE259-BE261, BE414, BE457-BE459, BE463-BE471, BE473-BE474
2	87	1	0	3	0	BE110, BE113, BE166, BE178, BE180-BE183, BE185-BE187, BE207-BE217, BE229-BE232, BE240-BE243, BE255, BE257-BE258, BE262-BE266, BE268-BE269, BE288-BE297, BE318-BE323, BE335-BE343, BE355, BE360-BE366, BE376-BE379, BE382, BE404-BE407, BE426, BE445, BE447, BE453-BE454, BE456
3	66	0	0	4	0	BE13, BE19, BE104-BE105, BE179, BE184, BE188-BE194, BE198-BE206, BE218-BE228, BE233-BE239, BE244-BE249, BE270-BE287, BE300-BE301,
4	24	0	0	0	0	BE298-BE299, BE302-BE306, BE308-BE312, BE324-BE327, BE330-BE331, BE408-BE413,
5	1	0	0	0	1	SR411
6	3	0	0	0	0	SR384-SR386
7	61	3	0	8	7	SR21, SR101, SR102, SR136, SR146, SR274-SR278, SR289-SR297, SR300-SR306, SR310, SR319-SR326, SR329, SR361, SR371-SR379, SR381-SR382, SR408-SR410, SR415, SR417-SR419, CE33, CE45, CE49, CE216-CE221
8	2	0	0	0	0	SR380, SR383
9	8	0	0	0	0	SR330-SR337
10	77	2	0	3	0	SR153, SR196-SR197, SR281-SR288, SR298, SR308-SR309, SR311-SR318, SR327-SR328, SR338-SR360, SR362-SR370, SR387-SR402, SR405-SR407, SR412-SR414, SR416
11	34	0	0	1	0	SR75, SR246-SR273, SR279-SR280, SR307, SR403-SR404
12	19	0	0	0	0	BE350, BE356-BE357, BE359, BE367-BE371, BE380-BE381, SR238-SR245
13	26	0	0	0	0	BE313-BE317, BE328-BE329, BE332-BE334, BE344-BE349, BE351-BE354, BE372-BE375, BE383, BE443
14	12	0	0	0	2	BE387-BE396, BE461-BE462

TABLE 5: Continued

Summary of Stage I Survey

Stratum No.	Open	No. Sites Shelter	Mound	No. Previously Recorded	No. in Borrow Area/ Relocation	Site Numbers
15	10	0	1	0	0	BE384-BE386, BE397-BE403, BE421
16	27	0	0	0	6	HE167-HE179, HE189-HE192, HE285-HE288, HE305-HE309, HE460
17	32	1	0	0	0	BE415-BE420, BE422-BE425, BE427-BE433, BE435-BE442, BE444, BE446, BE448-BE452, BE455
18	15	0	0	0	0	HE212-HE213, HE222-HE228, HE244-HE246, HE298-HE304,
19	54	0	0	4	0	HE9, HE119, HE122, HE229-HE230, HE238-HE243, HE247-HE251, HE256, HE258, HE279, HE294-HE295, HE310, HE342-HE343, HE395-HE396, HE404-HE405, HE428-HE429, HE433, HE458-HE459, HE464-HE472, HE474, HE483-HE487, HE559-HE565
20	99	0	0	9	0	HE8, HE14, HE16, HE17, HE114, HE116, HE117, HE126, HE131, HE180-HE184, HE217-HE220, HE231-HE234, HE252-HE254, HE257, HE277-HE278, HE283-HE284, HE311, HE326, HE328-HE340, HE347-HE353, HE360-HE363, HE365-HE373, HE378, HE392-HE394, HE401-HE403, HE426-HE427, HE434-HE438, HE475-HE480, HE504
21	111	1	0	6	0	HE10, HE11, HE13, HE15, HE123, HE124, HE185-HE188, HE193-HE211, HE214-HE216, HE221, HE259-HE265, HE274-HE276, HE280-HE281, HE289-HE293, HE296-HE297, HE313, HE315-HE325, HE345-HE346, HE355-HE356, HE374-HE377, HE399-HE400,HE406-HE425, HE439-HE440, HE444-HE451, HE456-HE457, HE460-HE461, HE473, HE488-HE489
22	39	0	0	1	0	HE12, HE255, HE266-HE273, HE282, HE314, HE320, HE344, HE397-HE398, HE441-HE443, HE452-HE455, HE549-HE558, HE566-HE571

conditions (feedlots, churchyards, etc.; n = 70, 7.9%). Survey conditions were not reported for four (0.58%) sites.

Even given the fact that many recorded sites were in fields, the reported extent of ground cover was nearly evenly split among the four categories: 0-10% (n = 247 = 27.8%); 10-50% (n = 196 = 22.1%); 50-90% (n = 227 = 25.6%); 90-100% (n = 195 = 22.0%). Percent of ground cover was not reported in 22 cases (2.5%). Table 6 crosstabulates this variable with kind of ground cover. Sites in woods, pastures, and wasteland (abandoned land) have a far greater percent of ground cover than do fields, supporting the prediction made earlier (Chapter IV).

A possible further source of bias is the magnitude of the stream and the kind of survey conditions encountered along its reaches. It was earlier predicted that smaller streams should show larger proportions of woods and pasture than should main streams which should have more sites in fields. This in fact does not seem to be true. Fields almost uniformly account for over half the sites along all streams or stream types, including tributaries as well as tributaries of tributaries (Table 7). Other than the Sac River, where fields account for 41.2% of the sites, the major exception is Tebo Creek, where only 4.2% of the sites were in fields. These percentages may be misleading, however, since small numbers of sites were recorded along both the Sac River and Tebo Creek.

It was also predicted that annual variation would have a different effect on different surfaces. Table 8 crosstabulates figures on season and extent of ground cover in woods, pastures, and fields. Although in all cases chi-square values suggest that the amount of

TABLE 6

Percent of Ground Cover by Type of Ground Cover - Stage I Survey

	Woods	Pasture	Wasteland	Fields	Total
0 - 10%	2	3	1	214	220
10 - 50%	6	8	2	171	187
50 - 90%	20	29	14	149	212
90 - 100%	41	56	24	49	170
Total	69	96	41	583	789*

*This total excludes all shelters and mounds, as well as the 22 sites for which percent of ground cover was not reported, plus those sites in other than woods, pasture, wasteland, or fields.

TABLE 7

Type of Ground Cover by Stream - Stage I Survey

	Woods	Pasture	Waste	Fields	Other	Total
Pomme de Terre	5	10	0	91	4	110
Osage	8	4	14	84	7	117
South Grand	18	11	8	60	13	110
Sac	3	4	0	7	3	17
Tebo Creek	6	10	5	1	2	24
Deepwater Creek	3	6	2	43	4	58
Little Pomme	0	0	0	60	0	60
Tributary	17	23	8	144	12	204
Tributary of Tributary	13	28	5	103	20	169
Total	73	96	42	593	65	869

TABLE 8

Extent of Ground Cover by Season by Type of Ground Cover - Stage I Survey

	Sept.-Mar.	April	May	June	July	Aug.	Total
A. Woods							
0-10%	1	0	0	0	1	0	2
10-50%	3	0	0	2	0	1	6
50-90%	4	0	1	0	11	4	20
90-100%	16	2	1	0	8	14	41
Total	24	2	2	2	20	19	69
B. Pasture							
0-10%	0	0	0	3	0	0	3
10-50%	1	0	0	0	3	4	8
50-90%	13	0	0	0	11	5	29
90-100%	21	2	0	6	9	18	56
Total	35	2	0	9	23	27	96
C. Fields							
0-10%	21	0	19	86	65	23	214
10-50%	49	1	0	41	59	21	171
50-90%	47	2	0	8	63	29	149
90-100%	8	2	0	8	27	4	49
Total	125	5	19	143	214	77	583

ground cover and the time of year surveyed are not independent, it is still apparent that fields fluctuate more throughout the year than do either woods or pastures. Specifically, there is an increase in ground cover in fields as the agricultural cycle progresses. Although summer is normally the season of peak field activity for archeologists, it is in fact <u>not optimal for survey</u>.

Selection bias and effects of different kinds of survey conditions on site recovery, and annual variation in ground surfaces were the first two of five reliability topics presented in Chapter IV and capable of being assessed in the present study. The third and fourth topics – reduction in bias due to adoption of a sampling strategy, and the efficiency of shovel testing – are not relevant to the Stage I survey. The fifth topic, individual variation is, however, highly relevant.

Individual variation from surveyor to surveyor could be assessed for any variable in the data set. Analysis of most of the data suggested, however, that individual variation was scarcely noticeable in any variable – except for size of site. Assessing the size of an archeological site has always been a matter of difficulty for archeologists. Although site size has indeed often been used as a clue to a site's position in a settlement system (e.g., Munson 1971; Adams and Nissen 1972; G. A. Johnson 1975), the accurate measurement of site size is, in fact, often a problem. Further, even if sizes were measured in a replicable manner, one could still ask the <u>meaning</u> of the size measurement. Is the area that of behavioral spece, or only of archeological context (cf. Reid, Schiffer, and Neff 1975: 211)? In other words, is a site size measurement, subject as it is to variation by purely non-cultural transformation processes, really a behaviorally meaningful measurement? One can suspect not, particularly on multi-component sites.

Having rejected the practice of using site size as a behaviorally meaningful measurement, evidence is now presented suggesting that the measurements are so highly subject to individual variation as to be useless anyway. Surveyors were asked to record the size of each site they surveyed, and it is this measurement, taken from the original survey forms, that is listed (Table 4). Table 9, however, presents a test of the null hypothesis that recorded size of site does not vary across surveyors. The F-ratio of 22.80 (see Blalock 1960: 242-253, for an excellent introductory discussion of analysis of variance and the F-test) has a probability of less than .001, suggesting rejection of the null hypothesis.

One could argue, of course, that the kinds of field conditions encountered by the surveyors, and the time and place and time of year in which different individuals functioned varied so highly that a comparison of the kind made is unfair. Perhaps so, but the possibility is considered unlikely. For the most part, assignment of surveyors to areas was randomized, and survey conditions, times, and kinds of places tended to be equal. Multiple regression could perhaps be employed to more fully evaluate the possibility, but it is not attempted in this report.

In sum, Stage I survey, although areally extensive, was obviously selective of the kinds of places surveyed. While a large number of sites were recorded, there is no good way to evaluate the behavioral bias that may have

TABLE 9

Analysis of Variance - Size of Site
By Surveyor - Stage I Survey

Surveyor	$\bar{X}$	S^2	N
1	2,998.19	4,923.31	83
2	2,088.41	1,609.98	44
3	5,346.50	11,962.06	112
4	801.43	1,042.19	21
5	2,053.48	6,253.84	102
6	685.88	1,452.18	17
7	2,401.74	4,098.86	201
8	10,909.55	11,419.37	199
	4,918.15	8,909.72	779

	SS	DF	MS
Between groups	*	7	*
Within groups	*	771	66365072.0
Total	*	778	

$F = 22.80$ $p < .001$

*Values too large to be printed by SPSS program Breakdown.

been introduced by the kind of survey strategy employed. For example, the same reasons that lead 20th century farmers to cultivate land where they do may have also influenced prehistoric peoples to carry out a particular set of activities in the same kinds of places; or the fact that woods have not been cleared from their present stands may or may not be a continuation of a practice of limited use of these areas going back for millennia. In order to be able to construct models of known bias, therefore, the survey strategy must be altered. As explained above, therefore, this was one purpose of the Stage II survey.

Stage II Survey

The second stage of the survey was a stratified random transect survey, designed to cover 10% of the reservoir acquisition area. It also had three purposes: (1) to provide a sample of known bias to use in estimating parameters of the population of sites in Truman Reservoir – including, for cultural resource management purposes, an estimate of the extent and nature of the cultural resource base in the reservoir – (2) to ensure equal (i.e., proportional) coverage of all major divisions of the reservoir, and (3) to allow for use of different observational techniques when the ground is largely or wholly obscured.

Fieldwork began on 1 March 1976 with three two-person survey crews, led by John F. Doebley, Michael R. Piontkowski, and Christopher M. Young. During the months of June through early August, four two-person crews were employed with James A. Donohue leading the fourth crew. Doebley, Donohue, and Young led the three two-person crews that worked from late August through mid-December. The fieldwork for the survey was completed on 1 December 1976. The survey design, strategy, and technique employed during this entire nine month period was that outlined in the last chapter.

During the summer of 1976, a two month testing program, from 6 June to 6 August, was carried out in a series of rockshelters in St. Clair County. Two three-person crews were led by Charles E. Cantley and Andrea L. Novick. The goals of the testing program, the articulation of these goals with the overall goals of the survey project, and the results of the testing program are described by Cantley and Novick in Volume VIII of the present report.

Stage II therefore concentrated on an intensive survey of 106 of the 1060 potential 1/8 mile wide transects in the acquisition area. These transects are listed above (Table 2), and their distribution is illustrated (Fig. 11). The surveyed transects encompass 16,199.13 acres (25.31 mi^2 = 64.80 km^2) or 9.79% of the 165,431.49 (258.49 mi^2 = 661.73 km^2) included within the survey strata as we calculated the area. (Note: A slight discrepancy exists between these figures and Corps of Engineers calculations of area. The discrepancy amounts to less than 1% and is undoubtedly due to measurement error in our calculations of acreage within survey strata.) A listing of acreage within each stratum is given above (Table 2), while that within each transect is listed as part of the summary table for Stage II survey (Table 10).

The nine-month transect survey recorded the locations of 476 prehistoric sites (Table 11) within the surveyed area. An additional 65 sites (Table 12) were recorded during Stage II survey beyond the limits of the

TABLE 10

Summary of Stage II Survey

Transect No.	Area	No. of Sites: Open	Shelter	Mound	Site Numbers
Stratum I - Middle Pomme De Terre River					
1	80.00	7			BE525-BE531
7	259.85	11			BE472, BE476, BE540-BE545, BE547, BE555-BE556
13	166.67	4		2	BE534-BE539
14	166.67	1			BE546
35	206.06	12	2		HI274-HI284, HI286-HI288
42	205.30	9	1		HI231, HI233-HI235, HI270-HI274, HI285, HI289
59	65.91	5			HI290-HI294
79	25.76	0			-
Out of Trn.	-	1			BE554
Stratum II - Lower Pomme De Terre River					
13	185.60	1			BE208
15	83.20	3			BE183, BE187, BE485
25	217.60	13			BE506-BE518
38	134.40	3			BE297, BE479, BE484
Out of Trn.	-	0			-
Stratum III - Little Pomme De Terre River					
6	109.44	10			BE19, BE103, BE179, BE480-BE483, BE486-BE488
12	92.16	8			BE190, BE191, BE194, BE490-BE494
28	85.76	7			BE220, BE495-BE500
42	88.32	9			BE270, BE280, BE281, BE283, BE285-BE287, BE502-BE503
52	68.48	3			BE301, BE504-BE505
Out of Trn.	-	2			BE489, BE501
Stratum IV - Hogles Creek					
11	145.45	3			BE551-BE553
12	145.45	3		1	BE548-BE550, BE561
21	233.33	11			BE520-BE524, BE532-BE533, BE557-BE560
28	133.64	2			BE562-BE563
Out of Trn.	-	0			-
Stratum V - Bear Creek					
8	75.76	3		2	SR111-SR112, SR461-SR463
13	42.43	2			SR458-SR459
Out of Trn.	-	1			SR460
Stratum VI - Weaubleau Creek					
20	96.97	7			SR424-SR430
23	110.61	11			SR431-SR441
25	75.76	3			SR442-SR444
Out of Trn.	-	0			-

TABLE 10: Continued

Summary of Stage II Survey

Transect No.	Area	No. of Sites Open	Shelter	Mound	Site Numbers
Stratum VII - Sac River					
1	133.33	4			SR519-SR522
16	214.40	11			SR550, SR574-SR582, SR591
18	218.18	1			SR592
Out of Trn.	-	5			SR531-SR532, SR593, SR600-SR601
Stratum VIII - Salt Creek					
9	105.32	3			SR481-SR483
12	80.00	5	1	1	SR470-SR476
Out of Trn.	-	0			-
Stratum IX - Gallinipper Creek					
7	63.64	2			SR454, SR457
15	73.48	2			SR450, SR456
20	63.64	4			SR447-SR449, SR455
Out of Trn.	-	3			SR451-SR453
Stratum X - Upper Osage River					
21	102.40	3			SR494, SR495, SR602
29	51.20	6			SR496-SR501
38	57.60	10			SR523-SR530, SR540-SR541
42	140.80	8			SR536-SR538, SR605-SR607, SR609-SR610
46	192.00	6			SR542-SR545, SR603-SR604
49	128.00	3	1		SR546-SR549
55	108.80	2			SR594-SR595
73	140.80	4			SR596-SR599
79	147.20	0			-
Out of Trn.	-	1			SR608
Stratum XI - Upper Middle Osage River					
22	138.24	12		1	SR269, SR512, SR515-SR518, SR539, SR562, SR564-SR565, SR583-SR585
24	133.12	7			SR181, SR511, SR513-SR514, SR563, SR566, SR586
30	98.56	3			SR262, SR629-SR630
40	96.00	10			SR502-SR503, SR505-SR510, SR568-SR569
42	133.12	11			SR174, SR465, SR466, SR468, SR491-SR492, SR567, SR570-SR573
45	131.20	3			SR173, SR469, SR493
49	240.00	13	1		SR115, SR307, SR464, SR477-SR480, SR484-SR485, SR487-SR488, SR533-SR535
Out of Trn.	-	8			SR467, SR489, SR490, SR504, SR587-SR590

TABLE 10: Continued

Summary of Stage II Survey

Transect No.	Area	No. of Sites Open	Shelter	Mound	Site Numbers
Stratum XII - Lower Middle Osage River					
2	103.04	0			-
12	162.56	7			SR189, SR619-SR624
15	277.76	0			-
18	315.52	5			SR611-SR613, SR481-SR482
30	263.68	2			HE518-HE519
37	135.68	2			BE648-BE649
49	149.76	5			BE566-BE570
54	118.40	3			BE571-BE573
Out of Trn.	-	6			SR614, SR616-SR618, SR625, HE520
Stratum XIII - Lower Osage River					
12	261.12	1			BE582
29	131.20	6			BE574-BE577, BE579-BE580
45	211.20	6			BE372-BE375, BE581, BE583
52	175.36	10			BE585-BE592, BE645-BE646
54	51.20	1			BE584
Out of Trn.	-	2			BE578, BE647
Stratum XIV - Little Tebo Creek					
10	49.0	3			BE593-BE595
16	47.7	3			BE642-BE644
31	156.3	3			BE636-BE637, BE639
39	204.4	2			BE640-BE641
Out of Trn.	-	1			BE638
Stratum XV - Lower Tebo Creek					
15	184.32	8			BE598-BE603, HE490-HE491
23	317.44	17			BE606-BE618, BE620-BE623
27	300.16	10		1	BE624-BE627, BE629-BE635
Out of Trn.	-	6			BE604, BE605, BE619, BE628, BE596, BE597
Stratum XVI - Upper Tebo Creek					
3	55.68	2			HE503, HE506
25	192.64	14			HE492-HE501, HE504-HE505, HE507, BE650
31	188.80	2			HE508-HE509
39	314.24	9			HE512-HE515, HE526-HE530
Out of Trn.	-	3			HE502, HE510, HE511
Stratum XVII - Lower South Grand River					
7	97.92	2		1	HE525, HE586-HE587
32	122.88	2			HE438-HE439
34	188.80	1			BE654
44	309.76	7			BE660, BE668-BE673

TABLE 10: Continued

Summary of Stage II Survey

Transect No.	Area	No. of Sites Open	Shelter	Mound	Site Numbers
53	153.60	1			BE657
56	145.92	1			BE658
Out of Trn.	-	11		1	BE651-BE653, BE655-BE656, BE659, BE661-BE663, BE665-BE667
Stratum XVIII - Middle South Grand River					
2	88.32	1			HE524
8	58.88	1			HE516
22	216.32	1			HE521
35	170.24	0			-
46	174.08	3			HE166, HE532, HE538
53	138.24	4			HE535-HE537, HE588
Out of Trn.	-	6			HE146, HE517, HE533, HE539, HE572-HE573
Stratum XIX - Confluence Area					
1	156.00	4		1	HE327, HE430-HE432, HE574
10	125.00	0			-
21	150.00	3			HE120, HE462-HE463
29	160.00	6			HE341, HE575-HE579
42	140.00	4			HE580, HE582-HE584
Out of Trn.	-	6			HE522-HE523, HE542-HE544, HE581
Stratum XX - Upper South Grand River					
5	160.00	0			-
8	280.00	0			-
13	320.00	0			-
24	300.00	0			-
27	268.00	2			HE540, HE548
42	228.00	1			HE541
57	260.00	4			HE364, HE545-HE547
78	20.00	0			-
Out of Trn.	-	1			HE531
Stratum XXI - Deepwater Creek					
18	188.80	0			-
20	136.96	2			HE359, HE534
26	220.16	2			HE354, HE357
36	177.28				-
50	212.48				-
Out of Trn.	-	1			HE358
Stratum XXII - Cooper's Creek					
3	55.00	1			HE585
18	120.00	1			HE312
Out of Trn.	-	0			

TABLE 11

Site Data - Stage II Survey Sites

Site No.	Transect	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor
Stratum I - Middle Pomme de Terre River												
23BE525	1	740	60	.2	1	S	2,000	open	90-100	pasture	4	9
23BE526	1	740	60	.1	1	SW	6,000	open	90-100	pasture	4	9
23BE527	1	700	20	.1	1	W	6,000	open	90-100	pasture	4	9
23BE528	1	780	100	.1	1	W	400	open	50-90	woods	4	9
23BE529	1	760	80	.2	1	W	300	open	50-90	woods	4	9
23BE530	1	800	120	.2	1	W	500	open	50-90	woods	4	9
23BE531	1	790	110	.1	9	E	150	open	90-100	woods	4	9
23BE472	7	760	80	.2	9	SE	56,000	open	0-10	field	4	9
23BE476	7	710	30	.2	1	SE	1,000	open	90-100	waste	5	9
23BE540	7	720	40	.1	9	SE	7,500	open	90-100	pasture	5	9
23BE541	7	820	140	.2	1	N	80,000	open	50-90	woods	5	9
23BE542	7	700	20	.2	9	E	100	open	90-100	waste	5	9
23BE543	7	800	120	.2	1	SE	8,000	open	50-90	woods	5	9
23BE544	7	800	120	.2	1	N	5,000	open	90-100	woods	6	9
23BE545	7	780	100	.1	1	N	5,000	open	90-100	woods	6	9
23BE547	7	780	100	.1	1	N	25,000	open	90-100	waste	5	9
23BE555	7	740	60	.3	9	NE	2,500	open	90-100	waste	4	9
23BE556	7	800	120	.4	1	NE	10	open	90-100	woods	4	9
23BE534	13	760	80	.3	9	S	200	mds.	90-100	woods	4	9
23BE535	13	760	80	.3	9	N	800	open	90-100	woods	4	9
23BE536	13	760	80	.2	9	S	250	mds.	90-100	woods	4	9
23BE537	13	690	10	.1	9	open	100	open	90-100	pasture	5	9
23BE538	13	700	20	.2	9	open	8,000	open	90-100	pasture	5	9
23BE539	13	700	20	.1	2	SE	100	open	90-100	pasture	5	9
23BE546	14	820	140	.2	2	SW	100	open	90-100	woods	6	9
23HI274	35	740	50	.1	9	E	5,000	open	50-90	woods	3	9
23HI275	35	700	10	.1	9	W	3,500	open	10-50	field	3	9
23HI276	35	700	10	.1	9	NW	500	open	10-50	field	3	9
23HI277	35	730	40	.1	9	N	400	open	50-90	woods	3	9
23HI278	35	720	30	.1	3	NE	400	open	90-100	pasture	3	9
23HI279	35	720	30	.1	4	NE	100	open	90-100	pasture	3	9
23HI280	35	700	10	.1	9	W	300	open	90-100	woods	3	9
23HI281	35	710	20	.1	2	NW	100	open	90-100	pasture	3	9
23HI282	35	710	20	.1	9	N	150	sh.	10-50	pasture	3	9
23HI283	35	700	10	.1	9	S	100	open	50-90	pasture	3	9
23HI284	35	720	30	.1	9	S	10	sh.	0-10	woods	3	9
23HI286	35	710	20	.1	9	S	7,500	open	50-90	waste	3	9

TABLE 11: Continued

Site Data - Stage II Survey Sites

Site No.	Transect	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor
23HI287	35	710	20	.1	9	S	5,000	open	90-100	waste	3	9
23HI288	35	700	10	.1	1	E	4,500	open	90-100	pasture	4	9
23HI231	42	700	10	.1	9	SE	3,000	open	90-100	pasture	3	9
23HI233	42	710	20	.1	9	open	unknown	open	50-90	field	3	9
23HI234	42	700	10	.1	9	open	unknown	open	unknown	field	3	9
23HI235	42	700	10	.1	1	N	unknown	open	90-100	pasture	3	9
23HI270	42	710	10	.1	3	S	60	sh.	0-10	woods	3	9
23HI271	42	710	10	.1	3	S	500	open	50-90	pasture	3	9
23HI272	42	750	60	.1	3	S	unknown	open	10-50	woods	3	9
23HI273	42	820	130	.1	3	N	100	open	50-90	woods	3	9
23HI285	42	820	120	.1	2	NW	1,000	open	50-90	waste	3	9
23HI289	42	700	0	.1	9	N	4,000	open	90-100	pasture	3	9
23HI290	59	900	180	.1	9	open	unknown	open	90-100	woods	4	9
23HI291	59	720	0	.1	9	open	2,000	open	10-50	field	4	9
23HI292	59	730	10	.1	9	open	unknown	open	0-10	field	4	9
23HI293	59	720	0	.1	9	N	unknown	open	0-10	field	4	9
23HI294	59	860	140	.3	9	E	400	open	50-90	woods	5	9
Stratum II - Lower Pomme de Terre River												
23BE208	13	680	20	.2	9	NW	2,070	open	90-100	pasture	4	6
23BE183	15	660	0	.1	9	open	350	open	10-50	field	3	6
23BE187	15	660	0	.1	9	open	700	open	10-50	field	3	6
23BE485	15	700	40	.3	9	open	17,252	open	90-100	pasture	3	6
23BE506	25	780	90	.1	9	W	18,400	open	0-10		3	6
23BE507	25	800	130	.2	9	open	18,400	open	90-100		4	6
23BE508	25	670	0	.1	9	open	3,100	open	0-10	field	4	6
23BE509	25	670	0	.1	1	open	6,900	open	90-100	pasture	4	6
23BE510	25	680	10	.1	9	open	124,215	open	90-100	pasture	4	6
23BE511	25	680	10	.1	9	open	2,070	open	90-100	pasture	4	6
23BE512	25	670	0	.1	9	open	10,500	open	90-100	pasture	4	6
23BE513	25	680	10	.1	9	open	10,500	open	90-100	pasture	4	6
23BE514	25	670	0	.1	4	open	8,000	open	0-10	field	4	6
23BE515	25	670	0	.1	4	open	2,400	open	90-100	waste	4	6
23BE516	25	680	10	.1	3	open	7,550	open	90-100	pasture	4	6
23BE517	25	700	30	.1	3	NE	27,570	open	10-50	woods	4	6
23BE518	25	730	60	.2	3	open	unknown	open	10-50	woods	4	6
23BE297	38	680	0	.1	9	E	1,839	open	0-10	field	3	6
23BE479	38	710	40	.2	1	open	50	open	90-100	pasture	3	6
23BE484	38	700	30	.1	1	open	921	open	0-10	field	3	6

TABLE 11: Continued

Site Data - Stage II Survey Sites

Site No.	Transect	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor
Stratum III - Little Pomme de Terre River												
23BE19	6	660	10	.2	4	open	2,250	open	10-50	waste	3	5
23BE103	6	660	10	.1	4	open	400	open	50-90	waste	3	5
23BE179	6	660	10	.1	4	open	3,000	open	10-50	waste	3	5
23BE480	6	660	10	.1	4	open	800	open	50-90	waste	3	5
23BE481	6	660	10	.1	4	open	1,200	open	50-90	waste	3	5
23BE482	6	660	10	.3	4	open	900	open	10-50	waste	3	5
23BE483	6	660	10	.2	4	NW	1,500	open	10-50	field	3	5
23BE486	6	760	110	.1	1	S	50	open	10-50	woods	3	5
23BE487	6	780	130	.1	1	S	10	open	10-50	woods	3	5
23BE488	6	760	110	.2	1	E	600	open	0-10	pasture	3	5
23BE190	12	670	10	.1	1	open	5,000	open	0-10	field	3	5
23BE191	12	670	10	.1	4	open	25,000	open	10-50	field	3	5
23BE194	12	670	10	.1	4	open	1,200	open	0-10	field	3	5
23BE490	12	700	40	.1	4	SW	15	open	50-90	woods	3	5
23BE491	12	720	60	.1	1	NE	250	open	90-100	woods	3	5
23BE492	12	820	170	.2	1	NE	800	open	10-50	woods	3	5
23BE493	12	780	130	.1	1	E	300	open	0-10	woods	3	5
23BE494	12	760	110	.1	1	E	150	open	10-50	woods	3	5
23BE220	28	700	20	.1	2	E	36	open	0-10	field	3	5
23BE495	28	700	10	.1	2	open	40,000	open	0-10	field	3	5
23BE496	28	690	10	.1	4	open	49	open	0-10	field	3	5
23BE497	28	700	20	.1	4	open	600	open	0-10	field	3	5
23BE498	28	700	20	.1	4	open	64	open	0-10	field	3	5
23BE499	28	720	30	.1	1	NE	1,200	open	0-10	field	3	5
23BE500	28	690	10	.1	4	open	2,100	open	0-10	field	3	5
23BE270	42	720	10	.1	1	SW	450	open	10-50	field	3	5
23BE280	42	720	10	.1	4	open	4,400	open	10-50	field	3	5
23BE281	42	720	10	.1	4	open	800	open	90-100	pasture	3	5
23BE283	42	730	20	.1	4	E	300	open	10-50	field	3	5
23BE285	42	720	10	.1	4	open	144	open	10-50	field	3	5
23BE286	42	720	10	.1	4	open	150	open	10-50	field	3	5
23BE287	42	720	10	.1	4	open	375	open	10-50	field	3	5
23BE502	42	730	20	.1	4	E	600	open	90-100	pasture	3	5
23BE503	42	800	90	.1	4	S	450	open	10-50	woods	3	5
23BE301	52	740	10	.1	4	open	2,000	open	0-10	field	3	5
23BE504	52	730	0	.1	3	NE	2,000	open	0-10	field	3	5
23BE505	52	760	30	.1	1	N	8	open	50-90	woods	3	5

TABLE 11: Continued

Site Data - Stage II Survey Sites

Site No.	Transect	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor
Stratum IV - Hogles Creek												
23BE551	11	670	20	.2	4	open	300	open	0-10	field	6	6
23BE552	11	670	20	.1	4	open	880	open	0-10	field	6	6
23BE553	11	740	90	.1	4	open	5,000	open	50-90	woods	6	6
23BE548	12	670	20	.1	4	open	1,680	open	0-10	field	6	6
23BE549	12	670	20	.1	4	open	150	open	0-10	field	6	6
23BE550	12	700	50	.1	4	E	unknown	md.	90-100	woods	6	6
23BE561	12	760	110	.1	1	open	10,000	open	90-100	waste	6	6
23BE520	21	720	70	.1	1	NW	35	open	90-100	pasture	4	6
23BE521	21	710	60	.1	1	open	6,000	open	90-100	pasture	4	6
23BE522	21	700	50	.1	1	open	10,000	open	90-100	pasture	4	6
23BE523	21	690	40	.1	4	open	2,350	open	90-100	pasture	4	6
23BE524	21	690	40	.1	4	open	10,000	open	90-100	pasture	4	6
23BE532	21	780	120	.1	4	NE	7,340	open	50-90	waste	5	6
23BE533	21	760	100	.1	4	SE	700	open	50-90	waste	5	6
23BE557	21	780	120	.2	1	E	unknown	open	50-90	woods	5	6
23BE558	21	780	130	.1	2	N	unknown	open	50-90	woods	5	6
23BE559	21	780	130	.1	2	NE	unknown	open	90-100	woods	5	6
23BE560	21	740	90	.1	1	SE	unknown	open	50-90	woods	5	6
23BE562	28	710	50	.1	4	NE	5,000	open	50-90	pasture	6	6
23BE563	28	700	10	.1	4	SW	7,500	open	90-100	pasture	6	6
Stratum V - Bear Creek												
23SR111	8	850	170	.1	4	SE	64	md.	50-90	woods	6	5
23SR112	8	750	70	.1	4	W	unknown	md.	10-50	woods	6	5
23SR461	8	710	30	.1	4	open	1,200	open	10-50	field	5	5
23SR462	8	710	30	.1	4	open	20,000	open	50-90	pasture	6	5
23SR463	8	720	40	.1	4	S	5,000	open	90-100	woods	6	5
23SR458	13	720	40	.1	4	open	3,750	open	0-10	field	5	5
23SR459	13	720	40	.1	4	open	11,500	open	0-10	field	5	5
Stratum VI - Weaubleau Creek												
23SR424	20	710	20	.1	4	open	16,500	open	0-10	field	3	5
23SR425	20	700	10	.1	4	W	4,400	open	10-50	pasture	3	5
23SR426	20	750	60	.1	1	SE	30	open	10-50	feedlot	4	5
23SR427	20	810	120	.1	1	E	15	open	10-50	woods	4	5
23SR428	20	810	120	.1	2	S	12,000	open	10-50	woods	4	5
23SR429	20	750	60	.1	1	S	375	open	0-10	grass	4	5
23SR430	20	750	60	.1	1	S	10	open	0-10	woods	4	5

TABLE 11: Continued

Site Data - Stage II Survey Sites

Site No.	Transect	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor
23SR431	23	730	40	.3	4	N	750	open	0-10	field	4	5
23SR432	23	720	30	.3	4	N	10	open	0-10	field	4	5
23SR433	23	710	20	.1	4	open	5,000	open	0-10	field	4	5
23SR434	23	710	20	.1	4	open	200	open	0-10	field	4	5
23SR435	23	710	20	.1	2	NW	250	open	0-10	field	4	5
23SR436	23	710	20	.1	4	open	80	open	0-10	field	4	5
23SR437	23	710	20	.1	1	SE	1,000	open	0-10	field	4	5
23SR438	23	710	20	.1	4	open	10,000	open	0-10	field	4	5
23SR439	23	710	20	.1	4	open	40	open	90-100	pasture	4	5
23SR440	23	850	160	.3	1	open	600	open	50-90	pasture	4	5
23SR441	23	850	160	.4	1	open	3,000	open	50-90	woods	4	5
23SR442	25	710	20	.1	4	open	1,500	open	0-10	field	4	5
23SR443	25	720	30	.1	4	open	1,000	open	0-10	field	4	5
23SR444	25	740	50	.1	2	W	900	open	90-100	pasture	4	5
Stratum VII - Sac River												
23SR519	1	720	20	.1	9	open	46,701	open	10-50	pasture	6	11
23SR520	1	720	20	.1	9	open	12,183	open	10-50	pasture	6	11
23SR521	1	730	30	.1	9	open	12,183	open	10-50	pasture	6	11
23SR522	1	730	30	.1	9	open	28,427	open	10-50	pasture	6	11
23SR550	16	790	90	.2	2	open	40,610	open	0-10		6	11
23SR574	16	770	70	.2	2	S	40,610	open	90-100	woods	6	11
23SR575	16	710	10	.1	2	S	800	open	0-10	field	6	11
23SR576	16	750	50	.1	2	S	15,000	open	90-100	woods	7	11
23SR577	16	740	40	.1	9	S	17,500	open	90-100	woods	7	11
23SR578	16	750	50	.1	9	S	8,122	open	90-100	pasture	7	11
23SR579	16	750	50	.1	9	S	16,244	open	90-100	woods	7	11
23SR580	16	740	40	.1	9	S	15,625	open	90-100	woods	7	11
23SR581	16	720	20	.1	2	S	100	open	10-50	field	7	11
23SR582	16	720	20	.2	9	open	2,500	open	50-90	woods	7	11
23SR591	16	730	30	.1	9	open	400	open	50-90	woods	7	11
23SR592	18	830	130	.1	9	open	900	open	50-90	woods	7	11
Stratum VIII - Salt Creek												
23SR481	9	810	110	.1	1	W	75	open	50-90	waste	6	9
23SR482	9	790	90	.1	1	S	100	open	50-90	woods	6	9
23SR483	9	770	70	.1	1	SW	2,100	open	90-100	pasture	6	9
23SR470	12	740	40	.1	2	NE	4,800	open	50-90	woods	6	9
23SR471	12	710	10	.1	4	NE	4	md.	90-100	woods	6	9

TABLE 11: Continued

Site Data - Stage II Survey Sites

Site No.	Transect	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor
23SR472	12	700	0	.1	2	SE	100	open	50-90	woods	6	9
23SR473	12	700	0	.1	4	SW	500	sh.	0-10	woods	6	9
23SR474	12	720	20	.1	4	S	1,800	open	50-90	woods	6	9
23SR475	12	730	30	.1	4	E	6,000	open	50-90	woods	6	9
23SR476	12	740	40	.1	2	W	4,800	open	90-100	waste	6	9
Stratum IX - Gallinipper Creek												
23SR454	7	710	20	.1	1	NE	3,000	open	50-90	field	5	5
23SR457	7	720	30	.1	2	SE	1,800	open	90-100	pasture	5	5
23SR450	15	710	20	.1	1	open	60	open	90-100	field	5	5
23SR456	15	770	80	.1	4	E	600	open	50-90	woods	5	5
23SR447	20	770	80	.2	4	NW	600	open	10-50	woods	4	5
23SR448	20	810	120	.1	4	NW	300	open	10-50	woods	4	5
23SR449	20	710	20	.1	4	NW	60	open	50-90	waste	4	5
23SR455	20	800	110	.1	4	SE	6,000	open	10-50	woods	5	5
Stratum X - Upper Osage River												
23SR494	21	760	60	.1	10	open	3,200	open	50-90	pasture	6	9
23SR495	21	740	40	.1	1	SE	100	open	50-90	woods	6	9
23SR602	21	730	30	.1	10	W	700	open	90-100	woods	7	9
23SR496	29	760	60	.1	10	S	1,200	open	90-100	woods	6	9
23SR497	29	750	50	.1	10	S	1,000	open	90-100	pasture	6	9
23SR498	29	750	50	.1	1	S	900	open	50-90	woods	6	9
23SR499	29	750	50	.1	1	S	150	open	50-90	woods	6	9
23SR500	29	770	70	.1	1	E	400	open	50-90	woods	6	9
23SR501	29	760	60	.1	1	E	400	open	50-90	woods	6	9
23SR523	38	750	50	.2	10	SE	100	open	0-10	field	6	9
23SR524	38	730	30	.1	10	SE	3,000	open	0-10	field	6	9
23SR525	38	720	20	.1	10	S	2,250	open	0-10	field	6	9
23SR526	38	730	30	.1	1	E	100	open	0-10	field	6	9
23SR527	38	730	30	.1	1	E	400	open	0-10	field	6	9
23SR528	38	740	40	.1	1	E	300	open	0-10	field	6	9
23SR529	38	760	60	.1	1	S	100	open	90-100	woods	6	9
23SR530	38	730	30	.1	1	E	100	open	90-100	woods	6	9
23SR540	38	720	20	.1	1	SW	100	open	90-100	waste	6	9
23SR541	38	760	60	.1	3	E	100	open	90-100	woods	6	9
23SR536	42	730	30	.4	2	S	100	open	0-10	field	6	9
23SR537	42	730	30	.2	2	S	400	open	50-90	road	6	9
23SR538	42	800	100	.1	10	open	100	open	90-100	woods	6	9
23SR605	42	810	120	.1	10	open	500	open	50-90	woods	7	9

TABLE 11: Continued

Site Data - Stage II Survey Sites

Site No.	Transect	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor
23SR606	42	800	110	.1	10	NE	3,000	open	50-90	woods	7	9
23SR607	42	800	110	.1	10	NE	15,000	open	90-100	woods	7	9
23SR609	42	710	20	.1	10	S	900	open	90-100	waste	7	9
23SR610	42	780	80	.2	10	SW	3,500	open	90-100	woods	7	9
23SR542	46	700	10	.1	2	open	150	open	0-10	field	6	9
23SR543	46	710	20	.1	2	N	150	open	50-90	field	6	9
23SR544	46	720	30	.2	2	N	150	open	50-90	field	6	9
23SR545	46	730	40	.1	10	SW	1,500	open	90-100	pasture	6	9
23SR603	46	780	80	.1	10	SW	400	open	90-100	woods	7	9
23SR604	46	700	0	.1	10	SE	400	open	90-100	woods	7	9
23SR546	49	750	60	.2	1	W	400	open	90-100	pasture	6	9
23SR547	49	705	5	.2	1	NW	100	open	0-10	field	6	9
23SR548	49	700	0	.1	10	open	100	open	0-10	field	6	9
23SR549	49	710	10	.1	1	SE	70	sh.	0-10	woods	7	9
23SR594	59	730	40	.1	1	S	40	open	50-90	woods	7	9
23SR595	59	720	30	.1	10	E	100	open	50-90	woods	7	9
23SR596	73	710	20	.1	2	open	10,000	open	0-10	field	7	9
23SR597	73	700	10	.1	3	open	500	open	0-10	field	7	9
23SR598	73	700	10	.1	2	S	150	open	90-100	waste	7	9
23SR599	73	710	20	.1	2	S	900	open	90-100	waste	7	9
Stratum XI - Upper Middle Osage River												
23SR269	22	680	0	.1	1	E	5,000	open	50-90	pasture	6	5
23SR512	22	690	10	.1	10	open	150	open	0-10	field	6	5
23SR515	22	680	0	.1	1	open	700	open	0-10	field	6	5
23SR516	22	680	0	.1	1	open	2,000	open	0-10	field	6	5
23SR517	22	720	40	.2	1	E	20	open	50-90	pasture	6	5
23SR518	22	710	30	.1	1	S	18	md.	0-10	woods	6	5
23SR539	22	710	30	.4	1	S	782	open	0-10	woods	6	5
23SR562	22	720	40	.1	1	W	600	open	0-10	field	6	5
23SR564	22	720	40	.2	1	NE	1,200	open	50-90	woods	6	5
23SR565	22	750	70	.1	4	W	400	open	50-90	woods	6	5
23SR583	22	710	30	.1	4	E	100	open	0-10	field	6	5
23SR584	22	720	40	.1	4	E	300	open	0-10	field	6	5
23SR585	22	720	40	.1	10	E	800	open	10-50	woods	7	5
23SR181	24	680	0	.1	2	open	400	open	0-10	field	6	5
23SR511	24	690	10	.1	10	open	300	open	0-10	field	6	5
23SR513	24	690	10	.1	10	open	125	open	0-10	field	6	5

TABLE 11: Continued

Site Data - Stage II Survey Sites

Site No.	Transect	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor
23SR514	24	680	0	.1	10	open	200	open	0-10	field	6	5
23SR563	24	730	50	.1	1	W	2,000	open	90-100	pasture	6	5
23SR566	24	710	30	.1	4	open	40	open	10-50	borrow pit	6	5
23SR586	24	730	50	.1	1	E	800	open	10-50	woods	7	5
23SR262	30	690	10	.2	10	W	10,000	open	10-50	waste	6	5
23SR629	30	680	0	.1	10	E	1,200	open	0-10	road	6	5
23SR630	30	770	90	.5	1	W	600	open	10-50	woods	6	5
23SR502	40	690	10	.1	1	W	6,400	open	0-10	field	6	5
23SR503	40	690	10	.1	2	open	125	open	0-10	field	6	5
23SR505	40	740	60	.1	1	W	300	open	50-90	woods	6	5
23SR506	40	740	60	.1	1	S	400	open	10-50	woods	6	5
23SR507	40	750	70	.1	1	W	120	open	50-90	woods	6	5
23SR508	40	750	70	.1	1	W	875	open	10-50	woods	6	5
23SR509	40	800	120	.1	1	SW	800	open	50-90	woods	6	5
23SR510	40	770	90	.1	1	W	400	open	50-90	woods	6	5
23SR568	40	720	40	.1	1	E	1,500	open	90-100	pasture	7	5
23SR569	40	690	10	.1	10	E	280	open	0-10	buried	7	5
23SR174	42	680	0	.1	2	open	9,000	open	0-10	field	6	5
23SR465	42	690	10	.1	2	open	5,200	open	0-10	field	6	5
23SR466	42	690	10	.1	1	open	120	open	0-10	field	6	5
23SR468	42	690	10	.1	10	open	200	open	0-10	field	6	5
23SR491	42	690	10	.1	1	open	675	open	0-10	field	6	5
23SR492	42	680	0	.1	1	open	500	open	0-10	field	6	5
23SR567	42	680	0	.1	10	E	unknown	open	0-10	buried	6	5
23SR570	42	700	20	.1	1	E	1,200	open	10-50	garden	7	5
23SR571	42	690	10	.1	1	SE	1,200	open	90-100	pasture	7	5
23SR572	42	780	100	.1	1	NE	48	open	10-50	woods	7	5
23SR573	42	730	50	.1	1	S	300	open	50-90	pasture	7	5
23SR173	45	690	10	.1	3	open	1,200	open	0-10	field	6	5
23SR469	45	690	10	.1	3	open	600	open	0-10	field	6	5
23SR493	45	690	10	.1	2	open	180	open	0-10	field	6	5
23SR115	49	810	130	.1	10	S	400	sh.	0-10	woods	6	5
23SR307	49	740	60	.1	10	NE	3,000	open	10-50	woods	6	5
23SR464	49	700	0	.1	10	SE	200	open	90-100	woods	6	5
23SR477	49	690	10	.1	2	SE	400	open	90-100	woods	6	5
23SR478	49	690	10	.1	10	SE	225	open	50-90	woods	6	5
23SR479	49	700	20	.1	10	SW	2,500	open	90-100	waste	6	5
23SR480	49	850	170	.1	10	open	3,750	open	10-50	woods	6	5

TABLE 11: Continued

Site Data - Stage II Survey Sites

Site No.	Transect	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor
23SR484	49	850	170	.1	10	SW	300	open	50-90	woods	6	5
23SR485	49	800	110	.1	2	W	400	open	10-50	woods	6	5
23SR487	49	700	20	.1	10	SW	200	open	50-90	woods	6	5
23SR488	49	690	10	.2	10	open	200	open	0-10	field	6	5
23SR533	49	760	80	.1	10	E	500	open	0-10	woods	6	5
23SR534	49	700	20	.1	1	NW	375	open	10-50	woods	6	5
23SR535	49	700	20	.1	1	E	200	open	10-50	woods	6	5
Stratum XII - Lower Middle Osage River												
23SR189	12	690	20	.1	10	open	720,000	open	0-10	field	8	6
23SR619	12	680	20	.1	1	SW	3,600	open	50-90	waste	9	6
23SR620	12	670	10	.1	3	N	2,875	open	10-50	field	9	6
23SR621	12	690	30	.1	3	E	4,900	open	10-50	field	9	6
23SR622	12	710	40	.7	3	W	3,500	open	50-90	waste	9	6
23SR623	12	720	50	.7	1	W	400	open	50-90	waste	9	6
23SR624	12	710	40	.8	3	W	750	open	50-90	waste	9	6
23SR611	18	670	0	.1	10	open	750	open	10-50	field	7	6
23SR612	18	680	10	.1	10	open	2,500	open	10-50	field	7	6
23SR613	18	680	10	.1	1	open	1,500	open	10-50	field	7	6
23HE481	18	670	0	.1	2	E	900	open	10-50	pasture	7	6
23HE482	18	670	0	.1	2	SE	4,000	open	50-90	pasture	7	6
23HE518	30	680	20	.4	2	SW	1,000	open	50-90	waste	9	6
23HE519	30	680	20	.2	2	SW	950	open	10-50	field	9	6
23BE648	37	680	20	.2	10	NE	800	open	50-90	feedlot	9	6
23BE649	37	660	0	.1	10	N	4,500	open	0-10	field	9	6
23BE566	49	730	70	.1	10	W	2,500	open	10-50	woods	6	6
23BE567	49	680	20	.2	10	open	3,900	open	90-100	pasture	6	6
23BE568	49	670	10	.1	1	N	unknown	open	0-10	roadcut	7	6
23BE569	49	670	10	.1	1	W	1,100	open	50-90	waste	7	6
23BE570	49	680	20	.1	1	W	2,500	open	90-100	waste	7	6
23BE571	54	680	20	.1	10	open	75	open	90-100	waste	7	6
23BE572	54	680	20	.1	1	open	425	open	90-100	waste	7	6
23BE573	54	740	80	.1	1	open	11,450	open	50-90	woods	7	6
Stratum XIII - Lower Osage River												
23BE582	12	720	70	.1	1	SW	8,500	open	50-90	cemetery	7	5
23BE574	29	660	0	.1	1	open	32,500	open	0-10	field	7	5
23BE575	29	660	C	.1	1	open	400	open	0-10	field	7	5
23BE576	29	670	10	.1	1	open	450	open	0-10	field	[illegible]	5

TABLE 11: Continued

Site Data - Stage II Survey Sites

Site No.	Transect	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor
23BE577	29	670	10	.1	2	open	3,750	open	0-10	field	7	5
23BE579	29	660	0	.1	1	open	750,000	open	0-10	field	7	5
23BE580	29	700	40	.1	2	S	7,500	open	10-50	road	7	5
23BE372	45	660	0	.1	10	open	5,000	open	0-10	field	7	5
23BE373	45	670	10	.2	1	open	22,500	open	0-10	field	7	5
23BE374	45	680	20	.2	1	open	100	open	90-100	pasture	7	5
23BE375	45	730	70	.1	10	E	450	open	10-50	road	7	5
23BE581	45	660	0	.2	10	open	96	open	0-10	field	7	5
23BE583	45	670	10	.1	10	open	10,000	open	10-50	field	7	5
23BE585	52	690	30	.1	10	SW	1,875	open	0-10	field	7	5
23BE586	52	690	30	.2	10	S	15	open	50-90	road	7	5
23BE587	52	680	20	.1	1	open	200	open	90-100	waste	7	5
23BE588	52	680	20	.3	10	open	300	open	0-10	field	7	5
23BE589	52	680	20	.1	1	open	100	open	10-50	clearing	7	5
23BE590	52	670	10	.2	10	open	1,200	open	10-50	field	7	5
23BE591	52	670	10	.2	10	open	300	open	10-50	field	7	5
23BE592	52	670	10	.1	10	SE	3,000	open	10-50	field	7	5
23BE645	52	660	10	.1	10	W	15,000	open	0-10	pasture	9	5
23BE646	52	660	10	.1	10	S	250	open	50-90	woods	9	5
23BE584	54	670	10	.1	10	open	15,000	open	10-50	field	7	5
Stratum XIV - Little Tebo Creek												
23BE593	10	780	80	.1	2	W	625	open	50-90	pasture	7	11
23BE594	10	740	40	.2	2	open	4,000	open	10-50	field	7	11
23BE595	10	740	40	.2	2	open	2,700	open	10-50	field	7	11
23BE642	16	720	70	.1	1	W	12,500	open	10-50	field	9	11
23BE643	16	720	70	.1	1	W	unknown	open	90-100	waste	9	11
23BE644	16	720	70	.1	1	E	3,600	open	90-100	pasture	9	11
23BE636	31	690	0	.1	2	S	15,000	open	10-50	field	7	11
23BE637	31	720	20	.4	4	E	4,320	open	10-50	field	7	11
23BE639	31	690	0	.1	4	SW	25,000	open	10-50	field	8	11
23BE640	39	670	20	.1	2	W	7,000	open	10-50	pasture	9	11
23BE641	39	670	20	.1	4	E	unknown	open	90-100	pasture	9	11
Stratum XV - Lower Tebo Creek												
23BE598	15	680	30	.1	3	open	2,000	open	10-50	field	7	9
23BE599	15	680	30	.1	3	open	1,000	open	10-50	field	7	9
23BE600	15	690	30	.1	5	N	400	open	90-100	woods	7	9
23BE601	15	690	40	.1	5	NW	unknown	open	90-100	waste	7	9

TABLE 11: Continued

Site Data - Stage II Survey Sites

Site No.	Transect	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor
23BE602	15	680	30	.1	5	open	unknown	open	90-100	waste	7	9
23BE603	15	680	30	.1	5	SE	400	open	90-100	woods	7	9
23HE490	15	800	140	.1	5	E	unknown	open	10-50	woods	8	9
23HE491	15	800	140	.1	5	E	unknown	open	10-50	woods	8	9
23BE606	23	670	20	.1	5	open	400	open	10-50	field	7	9
23BE607	23	670	20	.1	5	open	300	open	10-50	field	8	9
23BE608	23	660	10	.1	3	open	400	open	10-50	field	8	9
23BE609	23	660	10	.1	3	SW	200	open	10-50	field	8	9
23BE610	23	660	10	.1	3	open	500	open	10-50	field	8	9
23BE611	23	660	10	.3	5	open	400	open	10-50	field	8	9
23BE612	23	660	10	.1	3	open	1,000	open	10-50	field	8	9
23BE613	23	660	10	.1	3	open	25	open	10-50	field	8	9
23BE614	23	660	10	.1	5	open	25	open	10-50	field	8	9
23BE615	23	660	10	.1	5	SE	1,000	open	10-50	field	8	9
23BE616	23	660	10	.2	5	SE	1,000	open	10-50	field	8	9
23BE617	23	660	10	.2	5	SE	700	open	10-50	field	8	9
23BE618	23	760	110	.1	5	S	100	open	50-90	woods	8	9
23BE620	23	660	10	.1	3	W	unknown	open	90-100	waste	8	9
23BE621	23	670	20	.1	5	open	600	open	90-100	waste	8	9
23BE622	23	670	20	.2	5	S	150	open	90-100	pasture	8	9
23BE623	23	670	20	.1	3	SW	2,500	open	90-100	waste	8	9
23BE624	27	750	100	.1	2	S	500	open	90-100	clearing	8	9
23BE625	27	820	170	.1	2	open	10	md.	50-90	woods	8	9
23BE626	27	660	10	.1	5	open	600	open	50-90	field	8	9
23BE627	27	670	20	.1	2	W	40	open	50-90	grass	9	9
23BE629	27	680	30	.1	2	W	unknown	open	50-90	road	9	9
23BE630	27	670	20	.1	2	E	375	open	90-100	woods	9	9
23BE631	27	700	50	.1	5	NE	900	open	90-100	woods	9	9
23BE632	27	730	80	.1	5	E	unknown	open	90-100	woods	9	9
23BE633	27	760	110	.1	5	E	unknown	open	90-100	woods	9	9
23BE634	27	800	150	.2	5	E	unknown	open	90-100	woods	9	9
23BE635	27	810	160	.2	5	E	unknown	open	90-100	woods	9	9
Stratum XVI - Upper Tebo Creek												
23HE503	3	740	90	.2	4	S	5,000	open	50-90	pasture	9	5
23HE506	3	720	70	.1	4	S	600	open	50-90	field	9	5
23HE492	25	730	80	.1	5	N	1,500	open	10-50	field	9	5
23HE493	25	720	70	.1	5	N	400	open	10-50	field	9	5

TABLE 11: Continued

Site Data - Stage II Survey Sites

Site No.	Transect	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor
23HE494	25	740	90	.3	5	N	1,000	open	10-50	field	9	5
23HE495	25	720	70	.1	5	N	400	open	10-50	field	9	5
23HE496	25	720	70	.1	5	SE	400	open	10-50	field	9	5
23HE497	25	740	90	.1	5	N	400	open	10-50	field	9	5
23HE498	25	720	70	.1	3	E	300	open	90-100	waste	9	5
23HE499	25	750	100	.1	5	W	2,500	open	90-100	waste	9	5
23HE500	25	750	100	.1	5	W	150	open	90-100	waste	9	5
23HE501	25	740	90	.1	3	N	75	open	90-100	woods	9	5
23HE504	25	730	80	.1	4	W	900	open	50-90	pasture	9	5
23HE505	25	720	70	.1	4	W	600	open	50-90	pasture	9	5
23HE507	25	750	100	.1	4	E	1,200	open	50-90	roadside	9	5
23BE650	25	730	80	.1	2	S	6,000	open	10-50	waste	9	5
23HE508	31	710	60	.1	5	W	454	open	10-50	field	9	5
23HE509	31	710	60	.1	5	W	unknown	open	50-90	waste	9	5
23HE512	39	700	50	.1	2	SE	300	open	10-50	field	9	5
23HE513	39	700	50	.1	3	W	175	open	90-100	waste	9	5
23HE514	39	680	30	.1	3	W	1,875	open	50-90	waste	9	5
23HE515	39	750	100	.1	1	N	3,750	open	0-10	pasture	9	5
23HE526	39	740	90	.1	1	N	3,750	open	10-50	field	9	5
23HE527	39	710	60	.1	5	SW	100	open	50-90	pasture	9	5
23HE528	39	700	50	.1	5	SW	100	open	50-90	pasture	9	5
23HE529	39	730	80	.2	5	open	100	open	50-90	pasture	9	5
23HE530	39	690	40	.1	5	SW	750	open	90-100	waste	9	5
Stratum XVII - Lower South Grand River												
23HE525	7	660	0	.1	1	N	64	mound	90-100	woods	10	11
23HE586	7	680	20	.1	1	SW	1,250	open	90-100	pasture	11	11
23HE587	7	720	60	.1	1	SE	900	open	50-90	pasture	11	11
23BE438	32	700	40	.1	10	NW	85	open	90-100	pasture	10	11
23BE439	32	700	40	.1	10	NW	85	open	90-100	pasture	10	11
23BE654	34	700	50	.1	10	NW	25	open	90-100	woods	9	11
23BE660	44	660	10	.1	10	S	6,000	open	50-90	waste	9	11
23BE668	44	660	10	.2	10	N	unknown	open	90-100	waste	11	11
23BE669	44	670	20	.1	10	N	unknown	open	90-100	waste	11	11
23BE670	44	660	10	.1	10	N	unknown	open	90-100	waste	11	11
23BE671	44	660	10	.1	10	S	unknown	open	90-100	pasture	11	11
23BE672	44	670	20	.2	10	E	unknown	open	90-100	pasture	11	11
23BE673	44	660	10	.1	10	NE	unknown	open	90-100	pasture	11	11

TABLE 11: Continued

Site Data - Stage II Survey Sites

Site No.	Transect	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor
23BE657	53	700	50	.1	10	S	2,500	open	50-90	feedlot	9	11
23BE658	56	710	60	.1	1	S	4,500	open	10-50	pasture	9	11
Stratum XVIII - Middle South Grand River												
23HE524	2	700	20	.2	10	N	2,550	open	10-50	field	9	6
23HE516	8	750	70	.1	10	open	2,250	open	50-90	pasture	9	6
23HE521	22	690	10	.1	10	NW	11,900	open	0-10	field	9	6
23HE166	46	700	0	.1	1	N	37,500	open	50-90	pasture	10	6
23HE532	46	680	10	.1	10	open	12,700	open	50-90	pasture	10	6
23HE538	46	690	10	.1	1	SW	1,500	open	50-90	pasture	10	6
23HE535	53	710	50	.1	10	open	5,120	open	50-90	pasture	10	6
23HE536	53	710	50	.2	10	open	4,900	open	50-90	pasture	10	6
23HE537	53	710	50	.1	10	open	6,825	open	50-90	pasture	10	6
23HE588	53	750	80	.1	10	open	5,000	open	10-50	woods	11	6
Stratum XIX - Confluence Area												
23HE327	1	700	10	.1	4	W	14,000	open	50-90	field	12	8
23HE430	1	720	30	.1	10	S	7,000	open	10-50	field	2	8
23HE431	1	700	10	.2	10	S	6,000	open	10-50	field	2	8
23HE432	1	700	10	.2	10	S	6,000	open	10-50	field	2	8
23HE574	1	740	50	.5	4	open	150	mound	90-100	woods	11	9
23HE120	21	700	20	.1	10	S	3,750	open	10-50	field	7	5
23HE462	21	700	10	.1	10	open	3,000	open	0-10	field	5	8
23HE463	21	700	10	.1	10	S	15,000	open	0-10	field	5	8
23HE341	29	700	10	.1	10	N	25,000	open	10-50	field	12	8
23HE575	29	750	70	.2	2	open	600	open	0-10	field	11	9
23HE576	29	750	70	.2	2	open	500	open	0-10	field	11	9
23HE577	29	700	20	.1	10	S	7,000	open	0-10	field	11	9
23HE578	29	710	30	.1	10	SE	1,600	open	0-10	field	11	9
23HE579	29	710	30	.1	10	SE	400	open	0-10	field	11	9
23HE580	42	710	30	.1	3	open	1,000	open	50-90	waste	11	9
23HE582	42	750	70	.1	1	open	3,000	open	10-50	waste	11	9
23HE583	42	750	70	.1	3	open	2,500	open	90-100	waste	11	9
23HE584	42	710	30	.1	2	open	600	open	10-50	field	11	9
Stratum XX - Upper South Grand River												
23HE540	27	750	50	.2	3	open	15,000	open	0-10	field	11	9
23HE548	27	740	40	.1	1	open	unknown	open	90-100	woods	11	9
23HE541	42	700	0	.1	10	NE	50	open	0-10	riverbank	11	9
23HE364	57	690	0	.1	3	SW	50,000	open	10-50	field	1	8

TABLE 11: Continued

Site Data - Stage II Survey Sites

Site No.	Transect	Elevation (Ft. MSL)	Height above River	Distance to Water (.1 mi)	Rank of Nearest Water	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor
23HE545	57	730	30	.2	1	W	200	open	0-10	field	11	9
23HE546	57	700	0	.1	1	SE	5,000	open	0-10	field	11	9
23HE547	57	720	20	.1	3	NW	2,500	open	90-100	pasture	11	8
Stratum XXI - Deepwater Creek												
23HE359	20	710	20	.1	1	S	7,000	open	10-50	field	1	8
23HE534	20	710	10	.1	4	S	3,000	open	10-50	field	10	6
23HE354	26	700	10	3.2	2	S	5,000	open	50-90	field	1	8
23HE357	26	700	10	.1	5	S	8,000	open	90-100	field	1	8
Stratum XXII - Cooper's Creek												
23HE585	3	760	60	.2	4	N	unknown	open	90-100	woods	12	9
23HE312	18	700	10	.4	5	N	20,000	open	10-50	field	10	9

TABLE 12

Stage II: Out-of-Transect Sites

Site No.	Stratum	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor
23BE554	1	680	0	.1	1	open	Unknown	open	90-100%	waste	6	9
23BE489	3	820	170	.3	4	open	250	open	10-50	woods	3	5
23BE501	3	800	120	.1	4	open	525	open	10-50	woods	3	5
23SR460	5	720	40	.1	4	open	150	open	0-10	field	5	5
23SR531	7	820	120	.2	1	open	2030	open	50-90	pasture	6	11
23SR532	7	800	100	.4	1	open	2500	open	0-10	?	6	11
23SR593	7	830	130	.2	1	open	200	open	50-90	pasture	7	11
23SR600	7	710	10	.1	9	N	1000	open	10-50	field	7	11
23SR601	7	710	10	.1	1	open	1800	open	10-50	field	7	11
23SR451	9	710	20	.1	1	open	2000	open	0-10	field	5	5
23SR452	9	720	30	.1	1	SW	2100	open	90-100	field	5	5
23SR453	9	720	30	.2	1	SW	1800	open	10-50	woods	5	5
23SR608	10	700	0	.1	10	S	600	open	50-90	woods	7	9
23SR467	11	690	10	.1	1	open	450	open	0-10	field	6	5
23SR489	11	690	10	.1	10	open	3000	open	0-10	field	6	5
23SR490	11	690	10	.1	10	open	875	open	0-10	field	6	5
23SR504	11	690	10	.1	2	open	6000	open	0-10	field	6	5
23SR587	11	690	10	.1	10	open	450	open	0-10	?	6	5
23SR588	11	680	0	.1	10	open	Unknown	open	0-10	?	6	5
23SR589	11	680	0	.1	10	E	Unknown	open	0-10	?	6	5
23SR590	11	670	0	.1	10	W	Unknown	open	0-10	?	6	5
23SR614	12	690	20	.2	1	open	750	open	10-50	pasture	7	6
23SR616	12	690	20	.4	4	open	3600	open	0-10	field	8	6
23SR617	12	700	30	.4	4	open	7500	open	0-10	field	8	6
23SR618	12	680	10	.1	4	open	450	open	0-10	field	8	6
23SR625	12	690	30	.1	3	NE	150	open	50-90	?	9	6
23HE520	12	680	20	.1	1	SW	3850	open	10-50	waste	9	6
23BE578	13	670	10	.1	2	open	150	open	0-10	field	7	5
23BE647	13	650	0	.1	10	N	Unknown	open	0-10	?	9	5
23BE638	14	780	80	.4	1	open	50000	open	10-50	field	7	11
23BE604	15	670	20	.1	5	open	2000	open	10-50	field	7	9
23BE605	15	670	20	.1	3	open	1000	open	10-50	field	7	9
23BE619	15	720	70	.2	1	S	Unknown	open	90-100	woods	8	9
23BE628	15	710	60	.1	5	W	Unknown	open	90-100	pasture	9	9
23BE596	15	680	30	.1	3	open	1200	open	10-50	field	7	9
23BE597	15	680	30	.1	3	SW	2000	open	10-50	field	7	9
23HE502	16	770	120	.2	1	NW	Unknown	open	50-90	pasture	9	5

TABLE 12: Continued

Stage II: Out-of-Transect Sites

Site No.	Stratum	Elevation (Ft. MSL)	Height Above River	Distance to Water (.1 mi)	Rank of Nearest Water	Exposure	Size (m^2)	Type	% of Ground Cover	Nature of Ground Cover	Month Surveyed	Surveyor
23HE511	16	710	60	.1	5	NW	400	open	10-50%	field	9	5
23HE510	16	720	70	.1	5	SE	Unknown	open	90-100	pasture	9	5
23BE651	17	670	20	.1	10	SE	100	open	0-10	waste	9	11
23BE652	17	680	30	.1	10	open	600	open	90-100	waste	9	11
23BE653	17	670	20	.1	10	N	Unknown	open	90-100	waste	9	11
23BE655	17	720	70	.1	10	NW	60	open	90-100	woods	9	11
23BE656	17	660	10	.1	10	W	625	open	0-10	field	9	11
23BE659	17	660	10	.1	10	SW	1000	open	90-100	woods	9	11
23BE661	17	660	10	.1	10	W	3500	open	50-90	waste	10	11
23BE662	17	680	20	.2	10	N	8000	open	0-10	field	10	11
23BE663	17	660	10	.1	1	open	8000	open	90-100	woods	10	11
23BE666	17	760	110	.1	1	W	135	md.	n.a.	woods	11	11
23BE667	17	820	170	.1	1	open	Unknown	open	50-90	woods	11	11
23BE665	17	720	70	.2	10	S	2840	open	50-90	pasture	11	11
23HE517	18	750	70	.1	10	open	3300	open	50-90	pasture	9	6
23HE146	18	710	30	.1	10	SW	9100	open	50-90	pasture	10	6
23HE533	18	670	10	.1	1	SW	300	open	90-100	woods	10	6
23HE539	18	710	50	.1	10	SW	7200	open	50-90	pasture	10	6
23HE572	18	720	40	.1	10	open	5900	open	90-100	woods	10	6
23HE573	18	690	30	.1	10	SW	8500	open	50-90	pasture	10	6
23HE522	19	700	20	.1	1	open	31300	open	10-50	field	9	6
23HE523	19	700	20	.1	10	open	3680	open	10-50	field	9	6
23HE542	19	750	60	.2	10	open	Unknown	open	90-100	pasture	11	9
23HE543	19	750	70	.2	10	open	Unknown	open	90-100	pasture	11	9
23HE544	19	730	40	.2	1	SE	Unknown	open	50-90	waste	11	9
23HE581	19	710	30	.1	3	open	1500	open	10-50	waste	11	9
23HE531	20	750	40	.1	10	N	67	open	50-90	woods	10	9
23HE358	21	710	20	.1	1	S	4000	open	90-100	pasture	1	8

selected transects. The 476 in-transect sites include 460 (96.6%) open sites, 6 (1.3%) shelters, and 10 (2.1%) mounds or mound groups. The proportions are similar to Stage I except that mounds are slightly better represented. This is probably due to the fact that following transects to Corps of Engineers acquisition boundaries led survey teams across wooded ridge tops more frequently than during Stage I survey. Mounds, however, may still be underrepresented in proportion to their actual occurrence in the reservoir vicinity since only in parts of the eastern section of the reservoir does the Corps acquire ridge tops – the usual setting for mounds. The 65 sites recorded outside the selected transects included 64 open sites and one mound (Table 10).

The identical recording procedures used in Stage I and II survey allows not only a reporting of the reliability of Stage II in the same terms as Stage I survey, but also a comparison of the two surveys – the purpose of the third reliability topic introduced in Chapter IV. In the following discussion, therefore, Stage II survey is first evaluated in the same manner as was the Stage I survey, then the two surveys are compared. Finally, the utility of shovel testing – a technique used only during Stage II survey – is evaluated.

In contrast to the Stage I survey, only slightly over 1/3 of the Stage II sites recorded were in fields (170 of 476 = 35.7%). Over 1/4 were in woods (133 of 476 = 27.9%); 92 (19.3%) were in pasture, 55 (11.6%) were in abandoned land, while the remaining 26 (5.4%) were in miscellaneous other kinds of ground cover. The contrast between Stage I and Stage II survey is apparent (Table 13). A chi-square test of the null hypothesis that the kinds of

TABLE 13

Type of Ground Cover by Survey Stage

	Woods	Pasture	Waste	Fields	Other	Total
Stage I	80	96	44	593	70	883*
Stage II	133	92	55	170	26	476
Total	213	188	99	763	96	1359

$X^2 = 161.69$ DF = 4 $p < .001$

*Total excludes 4 sites for which survey conditions were not reported.

ground cover conditions under which sites were recorded is independent of the survey strategy employed has an associated probability of less than .001 that the observed distribution is due to chance. We conclude that the use of the transect survey did indeed force us to look in kinds of places which we would have otherwise regarded as unsurveyable, but which, importantly, did contain sites. It remains to be seen just how biased the representation in Stage I actually was.

Even though the kinds of conditions under which sites were recorded in Stage II survey is drastically different from Stage I, the extent of ground cover on recorded sites is again nearly evenly split among the four categories: 0-10% (n = 114 = 23.9%); 10-50% (n = 116 = 24.4%); 50-90% (n = 108 = 22.7%); 90-100% (n = 137 = 28.8%). Percent of ground cover was not recorded for one site (0.2%). As before, sites in woods, pasture, and abandoned fields are more heavily covered than are sites in fields (Table 14). The two surveys are compared below on the percent of ground cover variable (Table 15). A chi-square test of the null hypothesis that percent of ground cover on a recorded site is independent of the survey strategy under which it was recorded has a probability of between .02 and .01 of occurring by chance. The null hypothesis is tentatively rejected, but with some reluctance. The major variation from the expected, given random assignment, is in the 90-100% ground cover class, where a few more Stage I and a few less in Stage II sites occur than would be expected by chance alone – an interesting result given earlier results of crosstabulations of kind of ground cover with survey strategy.

Crosstabulations of figures on season and extent of ground cover in woods, pastures, and fields are offered

TABLE 14

Percent of Ground Cover by Type of Ground Cover - Stage II Survey

	Woods	Pasture	Waste	Fields	Total
0-10%	4	3	0	93	100
10-50%	28	8	5	66	107
50-90%	46	25	19	8	98
90-100%	40	55	31	2	128
Total	118	91	55	169	433*

* This total excludes all shelters and mounds, as well as the site for which percent of ground cover was not reported, and the sites in other than woods, pasture, wasteland, or fields.

TABLE 15

Extent of Ground Cover by Survey Stage

	0-10%	10-50%	50-90%	90-100%	Total
Stage I	247	196	227	195	865*
Stage II	114	116	108	137	475*
Total	361	312	335	332	1,340*

$X^2 = 10.02$ DF = 3 $.02 > p > .01$

*Totals exclude the 22 Stage I and 1 Stage II sites for which percent of ground cover figures are not recorded.

below (Table 16). The figures show a seasonal fluctuation less clearly. In general, they simply reiterate what was shown earlier (Table 8), viz., that fields have generally less ground cover than do other surfaces.

A test of the null hypothesis that recorded size of site does not vary across surveyors is given below (Table 17). An analysis of variance (F-test) somewhat surprisingly gives an F-ratio of 1.00 which, with 4 and 419 degrees of freedom, could easily occur by chance. The null hypothesis is thus accepted, suggesting that variation in size of site as recorded during Stage II survey is subject to other factors than the identity of the surveyor who recorded it. Figures on site size are therefore more reliable and usable, although the problems of behavioral interpretation discussed earlier remain.

The Pearson product-moment correlation (_r_; see Blalock 1960: 285-299) between the recorded size of the site and the number of person-hours spent in examining the site is .51. This is compared to a correlation of .22 between the same variables for Stage I sites. It would seem that the procedures involved in carrying out Stage II survey may have led to somewhat more care in measuring and recording, and thus to more useful results.

The final reliability issue raised here concerns the return for investment of time in shovel testing. Simple frequency distributions show that 101 (21.0%) of the 476 Stage II in-transect sites were shovel-tested. Over half of these were in pastures (Table 18), surprisingly few were in woods (only 11.9% of the open sites recorded in woods were shovel tested). Two possible explanations may be suggested for this observation: (1) pastures may have a greater percent of their ground surface obscured — which in fact is more or less true (Table 14) — and thus

TABLE 16

Extent of Ground Cover by Season by Type of Ground Cover - Stage II Survey

	Sept.-Mar.	April	May	June	July	Aug.	Total
A. Woods							
0-10%	1	1	0	2	0	0	4
10-50%	7	6	1	9	3	2	28
50-90%	6	4	7	20	8	1	46
90-100%	12	3	2	13	11	0	40
Total	26	14	10	43	22	3	118
B. Pasture							
0-10%	3	0	0	0	0	0	3
10-50%	3	0	0	4	1	0	8
50-90%	16	1	0	5	3	0	25
90-100%	20	18	5	7	4	1	55
Total	32	19	5	16	8	1	91
C. Fields							
0-10%	24	14	4	37	12	1	93
10-50%	35	1	1	0	17	12	66
50-90%	4	0	1	2	0	1	8
90-100%	1	0	1	0	0	0	2
Total	64	16	7	39	29	14	169

TABLE 17

Analysis of Variance - Size of Site
By Surveyor - Stage II Survey

Surveyor	$\bar{X}$	S^2	N
5	6,651.59	55,972.06	180
6	17,613.12	87,886.69	68
8	12,961.54	13,026.36	13
9	2,914.15	8,958.17	130
11	10,545.30	12,751.26	33
	7,760.17	51,142.23	424

	SS	DF	MS
Between groups	*	4	*
Within groups	*	419	*
Total	*	423	

$F = 1.00$ $p > .05$

TABLE 18

Shovel Testing by Type of Ground Cover

	No	Yes	Total
Woods	104	14	118
Pasture	33	58	91
Wasteland	36	19	55
Field	166	4	170
Other	20	6	26
Total	359	101	460*

*Total includes only open sites.

shovel testing is more frequently necessary in pastures than in woods, and (2) sites in woods may simply have a lower density of material and be less readily detectable via shovel testing (experience suggests that the kinds of places where woods as opposed to pastures are found generally do have smaller sites — but data are not available at this point to confirm or deny this possibility).

A further (but not surprising) result is reported (Table 19), viz. that nearly 3/4 (72 of 101 = 71.3%) of all shovel-tested sites were in ground cover conditions of 90-100%. Further, this accounted for 55% of all sites recorded under cover conditions of 90-100%, in contrast to the 4.6% under 0-10%, 6.1% under 10-50%, and 16.0% 50-90% ground cover. Clearly, and not unreasonably, surveyors felt it necessary to shovel test only in the heaviest of ground cover. Shovel testing was further employed mostly within transects. Only 4 of the 64 open sites recorded during Stage II survey, but not falling within transects, were shovel tested.

Interestingly, also, the mean size, as measured, of shovel tested sites does not vary significantly from those not shovel tested (Table 20). Perhaps the use of shovel testing then to attempt to determine the limits of the site resulted in a measurement similar to what would have been obtained had it been possible to delimit site boundaries solely from surface examination.

Summary and Conclusions

It has been emphasized throughout this report that a research oriented approach has been taken to the archeological survey of the Harry S. Truman Reservoir, an

TABLE 19

Shovel Testing by Percent of Ground Cover

	Yes	No	Total
0-10%	5	103	105
10-50%	7	107	114
50-90%	17	89	106
90-100%	72	59	131
Total	101	358	459*

*Includes only open sites, one of which has missing data for percent of ground cover.

TABLE 20

Size of Site by Shovel Testing

Shovel Test	Mean	Standard Deviation	N
No	7950.53	56998.39	335
Yes	7043.65	15511.90	89

$t = .15$ $DF = 422$ $p > .10$

approach argued for and taken by other contract archeologists as well (e.g., Schiffer and House 1975, House and Ballenger 1976). As a result, a research design was developed that viewed the archeological survey as a part of the archeologist's methodological arsenal for developing and testing hypotheses about human behavior. Survey is not a mechanical procedure, however. Simply walking a given plot of land does not guarantee that if a site is present it will be found. As has been seen, who surveys an area, when it is surveyed, and what kinds of survey conditions (kind and amount of ground cover, etc.) are encountered are all important variables in locating sites. It has been argued that the archeologist who wishes to use the results of a survey for any problem-solving purposes must assess the reliability of the survey.

This chapter has therefore had two purposes: (1) to report the findings of the archeological survey of the Harry S. Truman Reservoir, and (2) to present a brief quality-control evaluation of those results.

In brief, the locations of 1428 sites were recorded during the 15 months devoted to archeological survey in the Harry S. Truman Reservoir. Only 38 of these had been previously reported to the Archaeological Survey of Missouri. There were 887 sites recorded during the Stage I survey, and 476 were recorded during Stage II, i.e., that stage devoted to a stratified random sample of the acquisition area; during Stage II of the survey 65 sites were also recorded outside of the selected transects.

All five reliability topics introduced in the previous chapter were evaluated. As a result, several generalizations may be offered here as recommendations for surveys in general:

1. Seasonal variation does have a differential expression on different kinds of ground surfaces. Specifically, cultivated fields are more highly variable throughout the year than are other kinds of surfaces.

2. Archeological survey is best carried out at times other than during the summer.

3. Use of a probability sampling strategy definitely reduces bias in kinds of places surveyed and conditions under which those kinds of places are surveyed.

4. Shovel testing can be an effective technique for location of sites in areas in which the ground surface is otherwise obscured.

CHAPTER VI

ANALYSIS OF THE SURVEY DATA I: THE COLLECTIONS

Introduction

Examination of change, one of the stated goals of the Truman project, obviously requires a temporal scale along which to measure change. Such data are not, however, inherent in surface collections. Chronologically ordering survey collections can only be done by cross-dating from stratified and/or dated deposits either from within the area of study or from nearby areas. Thus, the analysis of chronologically sensitive artifacts, principally ceramics and projectile points, becomes a problem of <u>identification</u> of the artifacts and of placing them within established types. Identification is the opposite of <u>classification</u>, the formulation and statement of criteria for class inclusion, and therefore assumes prior specification of the criteria for identification of a specimen and assignment to a class (cf. Dunnell 1971).

The chronological analysis of the Truman Reservoir survey collections centered on two classes of artifacts — ceramics and projectile points. The surface collection of ceramics is small and the information potential therefore is low. Further, the stipulation of criteria for identification of ceramics from southwest Missouri has never been systematized. A reanalysis of previous collections, from a chronological or identification perspective, was therefore undertaken by Lisa G. Carlson, research assistant on the project, and is presented in Volume V.

Projectile points were rather more productive of chronological information for a wide area. Stipulation of criteria for their identification was, however, a difficult task. In fact, projectile point taxonomy for southwest Missouri is not systematized. Some of the problems and solutions are presented, along with descriptions of projectile points in the survey collections, by Roper and Piontkowski, in Volume V.

Once specimens are identified, the next task of the chronological analysis is to temporally order the components. This also requires first a stipulation of criteria for identifying components to periods of phases, followed by the actual assignment of components to these periods or phases. Criteria for assignment of components are discussed in Chapter II.

PALEO-INDIAN

Chapter II posed three alternative explanations for the nearly exclusive absence of fluted point forms in collections from the Truman Reservoir vicinity: (1) they are in fact not present, (2) there is sample error, or (3) such sites are buried. One objective of the survey was to help decide among these three possibilities. At the present time, it is possible to eliminate only the second explanation – that the failure to recover evidence of Paleo-Indian (i.e., fluted point) remains is due to sample bias; that is, unless they are so rare that a 10% sample is too small to reasonably expect to recover even a single specimen. The Stage II survey in particular was designed to systematically cover terrain in all types of places within Corps fee lands. Not a single fluted point was collected in the survey.

It is somewhat more difficult to decide between the two remaining explanations — i.e., whether the sites are buried or are simply not there. The latter of these two seems more plausible, given what is known of the terrace sequence along the major rivers in the reservoir area (Haynes 1976). However, even if Paleo-Indian remains are not there, it is still difficult to decide if they were never there or were there and have been subsequently removed by scouring action of the rivers. Not enough evidence is yet available, and may never be available, to decide among these possibilities.

DALTON

The same three possibilities were listed for the sparseness of reported Dalton material in the reservoir vicinity, since Rodgers Shelter was the only known Dalton component at the beginning of the present survey. The results of the survey indicate that Dalton materials, identified here by both Dalton and Plainview points, are sparse, but are present in the Truman Reservoir area. That they are sparsely represented is, however, at least partly due to the fact that they are buried in Holocene terraces. Indeed, this is the situation at Rodgers Shelter (McMillan 1976: 223). The Hand Site (23SR569), reported by Piontkowski in Volume IX, is buried in an equivalent age sediment (viz., Rodgers Alluvium) along the Osage River. The Montgomery Site (23CE261) on the Sac River between the Stockton and Truman reservoirs, is also buried in a Holocene age terrace of Rodgers Alluvium

(Donohue et al. 1977). Inasmuch as Rodgers Alluvium is now recognized along all major streams in the reservoir, it is apparent that the potential exists for future finds of Dalton age materials. Locating such components will, however, be contingent upon: (1) fortuitous finds of components as they are exposed by fluvial processes, and/or (2) systematic subsurface survey via coring or trenching. Neither of the latter techniques is totally satisfactory for locating the small, ephemeral occupations that are so far known to be associated with the Dalton period occupation of the central Osage River Basin.

In addition to the fortuitously exposed buried components, Dalton points were found on the surface of several other sites (Fig. 13). It is thus apparent that Dalton occupations not only are present in Truman Reservoir, but are present in both major physiographic regions (Ozark Highland and Western Prairie) in the reservoir. On the basis of currently available evidence it is impossible, however, to offer further comments concerning the Dalton tool assemblage or its technology, or the nature of Dalton occupations. All surface finds are from presumably multicomponent sites. The Hand Site seems to be single component, but since such a small area has been investigated, little is known about the site. The potential exists, therefore, for generating data on the question raised by McMillan (1976: 224) about how Rodgers Shelter compares with or complements other Dalton components in western Missouri. The realization of this potential will require more intensive investigations than the survey project could perform.

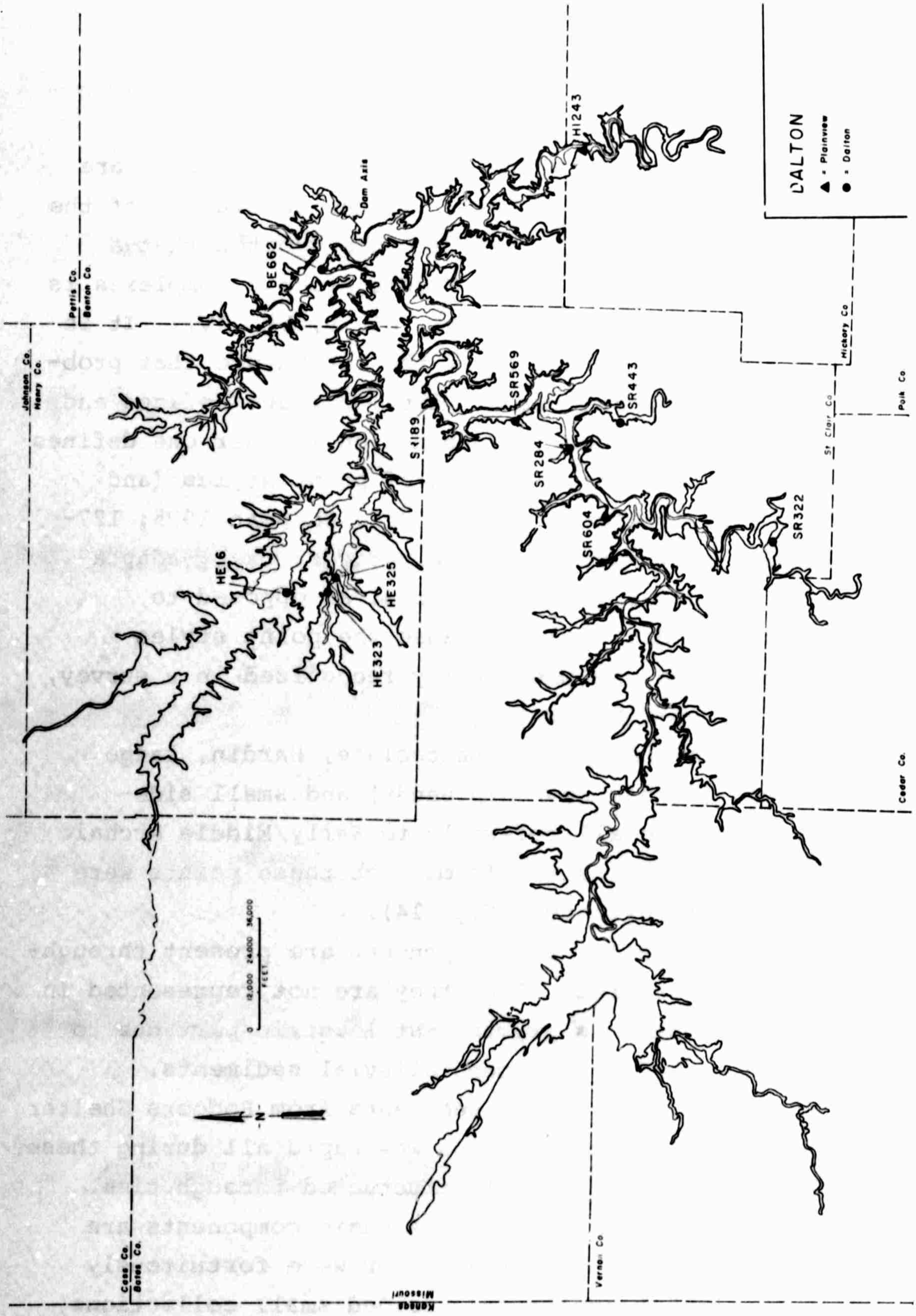

Figure 13. Distribution of Dalton Components.

EARLY/MIDDLE ARCHAIC

Although the Early and Middle Archaic periods are discussed separately in Chapter II, the conclusion of the analysis of chronological indicators suggested that a clear separation of Early and Middle Archaic complexes is difficult (Roper and Piontkowski Vol. V, Pt. IV). It is apparent from an examination of the literature that problems of definition are acute — i.e., how one defines and separates these two periods depends on whether one defines Early vs. Middle Archaic by sets of point styles (and possibly other artifacts as well (cf. Chapman 19' ›: 127-128, 158-159); by specified time periods; or by adaptations (post-glacial pre-Hypsithermal as opposed to Hypsithermal conditions). Because the point styles definition is the one most easily recognized in a survey, it is the one used here.

Bifurcated base, Rice Lanceolate, Hardin, large side-notched (Graham Cave-Big Sandy) and small side-notched points are all referable to Early/Middle Archaic occupations. The 35 sites from which these points were collected are illustrated (Fig. 14).

Early/Middle Archaic components are present throughout the reservoir area. That they are not represented in even larger numbers is probably at least in part due to sites being buried in Holocene alluvial sediments. Ahler's (1973b) analysis of sediments from Rodgers Shelter suggests that river aggradation was rapid all during these millennia — although the rate fluctuated through time.

Because most Early/Middle Archaic components are either from multi-component sites or were fortuitously exposed by fluvial action and yielded small collections,

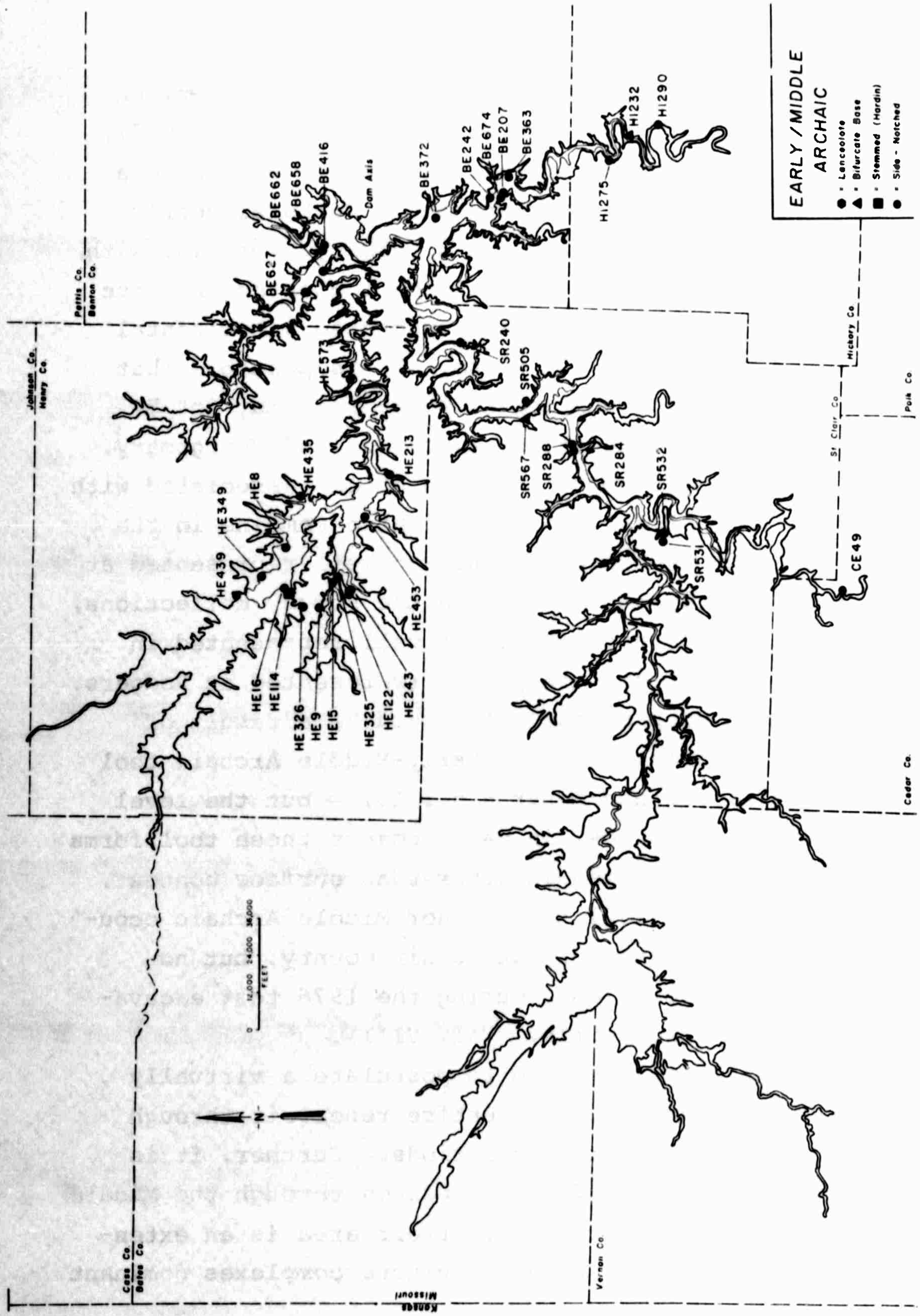

Figure 14. Distribution of Early and Middle Archaic Components.

the nature of the occupations remains poorly known. A brief test excavation at the Wolf Creek Site (23SR567), reported by Piontkowski in Vol. IX, Pt. I, suggested a bifurcated base tradition component. Cultural debris was sparse both in quantity and diversity. Probing with a 3-inch core beyond the test trench suggested the site was small; a creek bank profile suggested a horizontal measurement of perhaps 10m or so. It is possible that the Early Archaic occupation at Wolf Creek may not be unlike the Dalton occupation at Rodgers and Montgomery.

Less is known about the occupations associated with the other types of Early/Middle Archiac remains in the reservoir. The lanceolate points so well represented at Rodgers are poorly represented in the survey collections, but the small side-notched points well represented in the survey collections are poorly represented at Rodgers. It has been suggested that this could be a result of functional differentiation in Early-Middle Archaic tool assemblages (Joyer and Roper n.d.: 10) — but the level of demonstration is low, in part because these tool forms have yet to be recovered in other than surface context. Chapman (1975: 171-172) noted minor Middle Archaic occupations in rockshelters in St. Clair County, but no similar remains were found during the 1976 test excavations by Novick and Cantley (Vol. VIII).

In sum, it is possible to postulate a virtually continuous occupation of the entire reservoir through the Early and Middle Archaic periods. Further, it is important to note that from the Dalton through the Middle Archaic periods, the Truman Reservoir area is an extension, albeit marginal, of some culture complexes dominant in the southeastern United States at the same time. It would be an important problem for future research to know more about the nature of these occupations.

LATE ARCHAIC

Terrace 1b (Rodgers Terrace) still formed the floodplain of the major local rivers during Late Archaic times, but aggradation rates were now lower than ever before (Ahler 1973b). Although the possibility that Late Archaic components were being buried is still a real possibility, the problem seems to be less serious than with the preceding Early and Middle Archaic periods, and it is suspected that Late Archaic sites are more amenable to recording on the basis of surface evidence.

The Late Archaic period in the Truman Reservoir is presently characterized by specimens identified as Afton, Smith, Sedalia, Nebo Hill, Etley, and Stone Square Stemmed, and perhaps also Table Rock and Cupp. The first six of these types are represented at 66 sites throughout the reservoir (Fig. 15).

The 22 survey strata are collapsed into 4 groups: (1) Ozarks, (2) Transitional, mostly Ozarks, (3) Transitional, mostly Prairie, and (4) Prairie – the distribution of these six categories of points is shown in Table 21 (presence-absence at sites). The most marked differential is in the Nebo Hill and Etley points. Nebo Hill points, albeit sparsely represented (n=4), are confined to the Western Prairies area in Henry County. Etley points, on the contrary, are represented at 20 sites, but almost exclusively in the Ozark Highland portion of the reservoir.

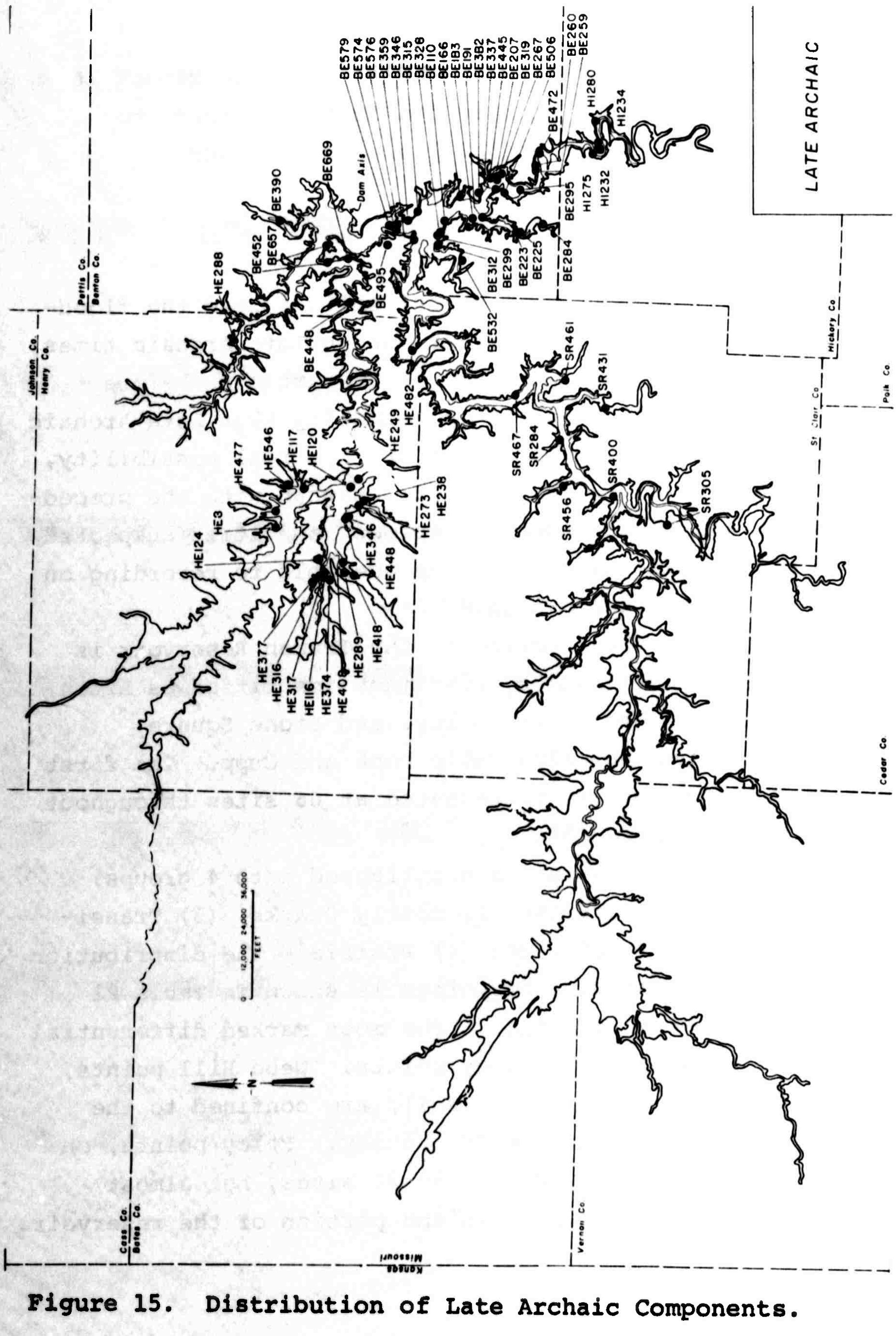

Figure 15. Distribution of Late Archaic Components.

TABLE 21

Distribution of Late Archaic Points by Physiographic Regions

	Ozark	Transitional-Mostly Ozark	Transitional-Mostly Prairie	Prairie
Nebo Hill	0	0	0	4
Sedalia	11	1	1	6
Smith	7	0	0	5
Stone Square Stemmed	3	4	0	6
Etley	17	2	0	1
Afton	7	1	0	7

Beyond these few distribution differences, however, the explanation for the diversity of styles associated with the Late Archaic occupation is unclear. It is possible that it is at least partially due to temporal differentiation. Late Archaic occupations are poorly dated in southwest Missouri and, indeed, anywhere in the Midwest. The possibility of functional variability is also real, although a study by Nicholas (1979) was unable to discern any functional differentiation of these types.

The nature of the Late Archaic occupation in the area is not well known, but at least is less poorly known than those of preceding periods. While the collections from the Late Archaic sites do not appear to contain the diversity of artifacts that are reported for Etley sites elsewhere in Missouri (Chapman 1975: 186-200); sites dating from this period are known to range from small sites with light debris density and a few points and other tools to relatively large, denser concentrations of a variety of tools. Certainly assemblages are larger and more diverse than are those of previous periods.

It is apparent that Late Archaic sites are found in a greater variety of kinds of places than are sites of preceding periods. This apparent expansion and diversification of the use of the landscape is indeed most compatible with an inferred use of a greater diversity of resources than is reflected at Rodgers Shelter (Parmalee, McMillan, and King 1976).

In sum, the survey documented, as expected, a rather substantial Late Archaic occupation throughout the reservoir area. A relatively wide diversity of styles is associated with this period, but the explanation of this diversity is unclear at present.

WOODLAND

Both the definition of the Woodland as being characterized by ceramics, and the traditional tripartite division of the Woodland into Early, Middle, and Late are unworkable in southwest Missouri. For one thing, ceramics were difficult to locate under the drought conditions prevailing in Missouri at the time of the survey. This last, however, may have been compounded by surveyor bias. All surveyors, at least all crew chiefs, had worked with ceramics at some time; but it eventually became apparent that not all of them were experienced in collecting pottery in the field. Because most of the sherds from open sites in Truman Reservoir are small and similar in color to the soil, finding them – particularly under drought conditions – is difficult enough even for a surveyor experienced in collecting ceramics on Midwestern sites.

As for dividing the Woodland, unless one wishes to use dates alone (and it is difficult to get them) then one soon discovers that the content of Early, Middle, and Late Woodland complexes is difficult to impossible to discern. Nevertheless, it is possible to discern at least three separate complexes of Woodland styles.

One of these is an occupation stylistically similar to Middle Woodland elsewhere in Missouri. Since ceramic recovery from the survey was minimal, it is not surprising that there are no identifiable Middle Woodland sherds in the collections. Examination of the collections, however, revealed 62 Snyders group projectile points from 56 different sites (Fig. 16) throughout the reservoir. All are open sites. Lacking, however, is

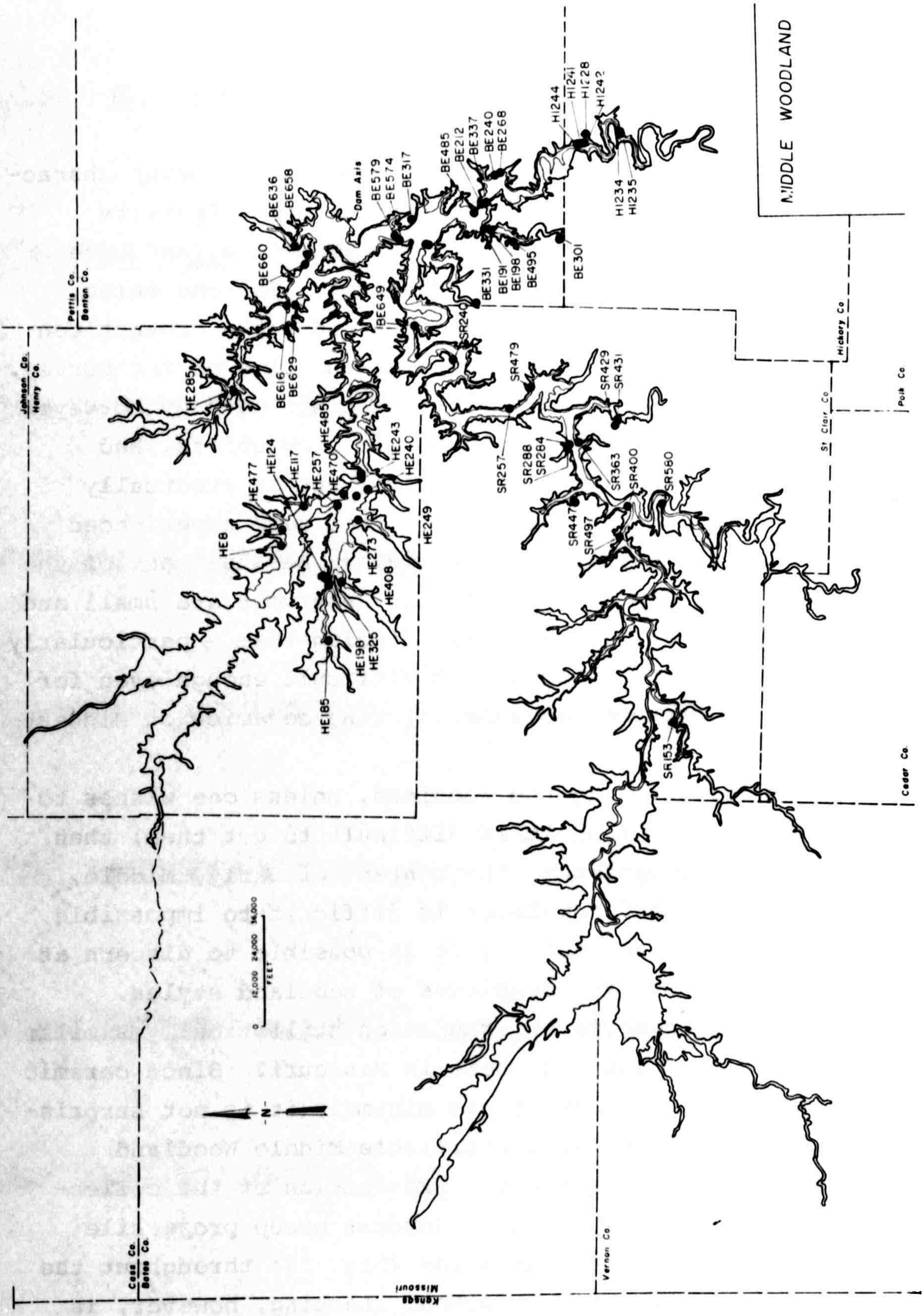

Figure 16. Distribution of Middle Woodland Components.

the diverse assemblage of distinctive chipped stone tools that characterize the major Middle Woodland occupation in the Missouri Valley (e.g., Kay 1975, Johnson, ed. 1976) and elsewhere (e.g., White 1968). No site, therefore, seems to give the impression of having been a locus of very prolonged activity or a permanent sort of habitation.

A. E. Johnson (1976) has developed a model of the Kansas City Hopewell settlement system. This model specifies an increase in population during the latter half of the 500 year (A.D. 1 - 500) sequence, leading to the establishment of ancillary hunting camps beyond the major habitation sites (Johnson 1976: 12). Johnson does not discuss areal limits of these hunting camps (beyond the Kansas City area), so it is impossible to guess whether or not the presence of Middle Woodland material in the Ozarks may be relevant to this settlement system. Future work should therefore be directed (if possible) to determining the nature of the Middle Woodland occupation of the central Osage River Basin.

Another Woodland component is defined as that represented by two contracting stemmed point forms: Gary and Langtry, at 101 sites recorded during the survey (Fig. 17). Whether or not even Gary and Langtry should be put together is questionable since most sites, both those recorded during the survey and those reported in the literature, have one or the other, but not usually both forms. Nevertheless, sites producing Gary and Langtry points seem similar in nature.

The dating of this complex is problematical. Contracting stemmed points are considered to be associated with Late Archaic remains, or at least to have predated

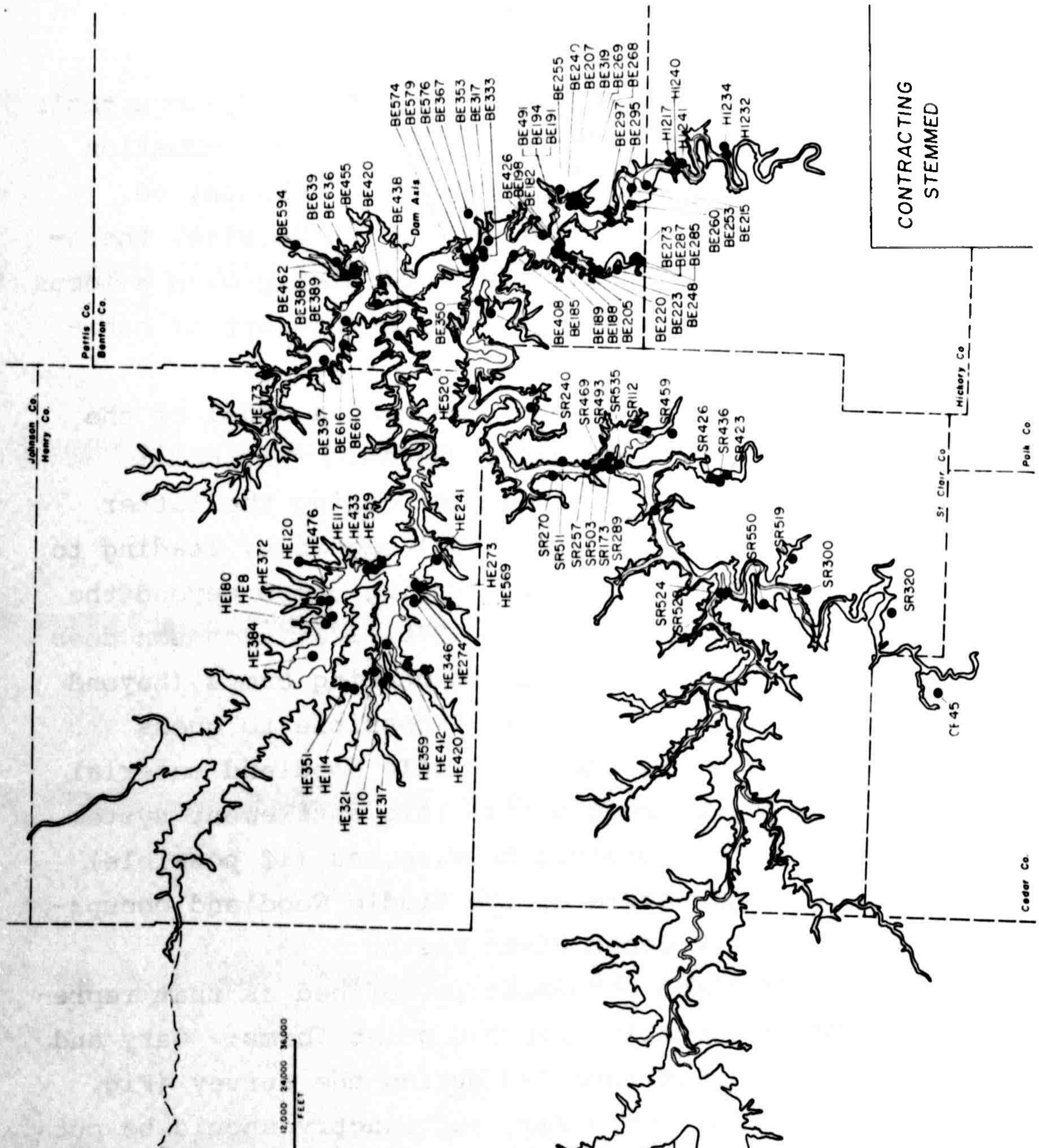

Figure 17. Distribution of Contracting Stemmed Point Components.

ceramics in Arkansas (Hoffman 1969, Scholtz 1969) and northeastern Oklahoma (Purrington 1971). The Oklahoma data are based on several stratified sequences, even though no dates are available. In Missouri, the several dates available are contradictory. Contracting stemmed points were associated with radiocarbon dates of 1920$\pm$50 B.P., 1910$\pm$80 B.P., and 1900$\pm$80 B.P. (A.D. 30, A.D. 40, A.D. 50) at Boney Spring in Benton County (Wood 1976d: 102) – dates probably not inconsistent with the inferred associations in Arkansas and Oklahoma – but rather inconsistent with the internally inconsistent dates of 560$\pm$100 and 1235$\pm$95 B.P. (A.D. 1390 and A.D. 715) at the Flycatcher Site in Cedar County (Pangborn, Ward, and Wood 1967: 10). Either the Flycatcher dates are in error or contracting stemmed points are very persistent on the Ozark periphery.

One has the distinct impression that the small hamlets known to be associated with contracting stemmed points – such as Flycatcher – occur at several places throughout the reservoir. Several of the sites, on which contracting stemmed points occur repeatedly, produce several kinds of specimens of contracting stemmed points, but of few other kinds. Ceramics are never associated with these sites.

The third complex recognized as Woodland is that represented by Scallorn and other arrowpoints and by Rice Side-Notched points. The large assortment of corner-notched forms may also be associated with this complex. Wood's (1961) Lindley Focus and Fristoe Burial Complex (1961, 1967) would be formulations similar to this one.

A total of 115 sites throughout the reservoir (Fig. 18) are associated with this complex – although this

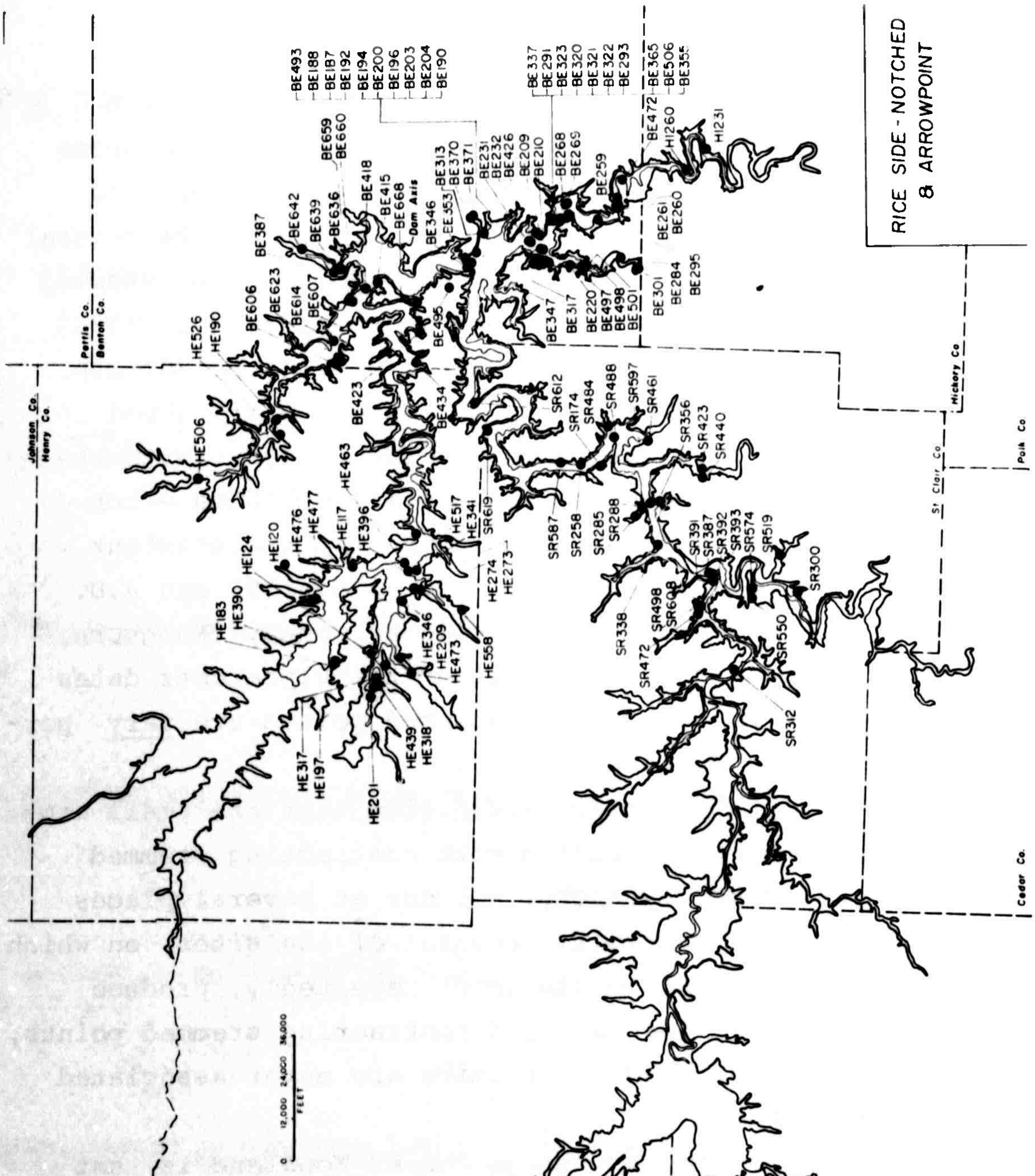

Figure 18. Distribution of Rice Side-Notched/Arrowpoint Components.

total does not include any sites not having either one or another form of arrowpoints or Rice Side-Notched points. Ceramics are present at some of these sites.

Sites representative of this complex are of several rather distinct types. The most obvious are very large sites with debris generally scattered for hundreds of meters, sometimes even over a kilometer, along the terraces of the broader segments of major river valleys in the reservoir. Such sites generally have relatively heavy debris scatters, occasionally including ceramics, although shovel tests or test pits often reveal no depth below the plow zone. Such sites are possibly the remains of repeated occupations in the same general area but not the same specific locus. Sites that are similar, but far smaller, occur all over the reservoir. Another type of site is a small site, at the edge of a large river, and characterized by the presence of perhaps one projectile point (often one of the arrowpoint types) and a handful of flakes, lightly scattered over a small area. Rockshelters were extensively used — perhaps on a short-term basis — by representatives of this complex (see testing reports by Chomko, Vol. VII and Novick and Cantley Vol. VIII). Finally, the burial mounds or cairns reported by Wood (1967) contain items stylistically similar to those from open sites and shelters.

The late prehistoric occupation of the central Osage River Basin is also characterized by ceramics recognizable as belonging to cultural complexes centered elsewhere. The most prominent of these ceramics are Pomona, best known from eastern Kansas (Witty 1967), and Steed-Kisker, centered in the Kansas City area. Both are identified from rockshelters only, and only on the basis of ceramics (Carlson, Vol. V; Wood 1968; Wood and Pangborn 1971: 19). At present, these occurrences seem to occur only in, or very near, the Western Prairies.

Other than Steed-Kisker - probably a Mississippianized but otherwise indigenous manifestation - there is little evidence for Mississippian use of the central Osage basin. A small amount of Caddo material occurs in mounds (Wood and Pangborn 1968) and shelters (McMillan 1966), but mostly in the present Stockton Lake area. Other shell-tempered material is presently unidentified. Table 22 shows the distribution of the major point groups associated with these last two Woodland complexes. Gary points in particular occur most frequently in the Ozarks.

It will be important to studies of cultural continuity and change on the Ozark-Plains interface to learn something of the nature of these occupations. It will be important to establish the chronological relationships among the various Woodland units recognized in the survey collections from the reservoir area. Beyond this will be the need to validate the various types of sites described above and determine the nature of their occupation. Interpretation of the nature of the Pomona, Steed-Kisker, and Caddo occurrences will also say much about cultural dynamics in southwest Missouri.

TABLE 22

Distribution of Woodland Points
by Physiographic Region

	Gary	Langtry	Rice Side-Notched	Arrowpoints
Stage I				
Ozarks	19	26	23	29
Truman-Ozark	6	9	11	7
Truman-Prairie	1	0	2	0
Prairies	0	20	8	11
Stage II				
Ozarks	2	11	8	8
Truman-Ozark	5	7	2	11
Truman-Prairie	0	0	1	2
Prairies	0	2	3	0

CHAPTER VII

ANALYSIS OF THE SURVEY DATA II: THE SITES

Chapter III outlined an approach to the study of settlement patterns and sketched some ideas for the integration of settlement systems. The present chapter discusses part of the working out of that approach as applied to the Truman Reservoir survey data. Because of the large number of sites (1428), the time-intensive nature of the data collection and analysis procedures, and the relatively short period of time elapsed since the conclusion of the survey fieldwork, it is not yet possible to present a complete and detailed analysis of the survey data. The following discussion will therefore concentrate on: (1) the description of the variables for which data have been or are being collected, and (2) the preliminary descriptive analysis of some of these variables for those in-transect sites recorded during Stage II survey.

The Variables

As described in Chapter III, three classes of variables are to be examined: hydrographic, topographic, and vegetational. Within each of these classes, data on several variables were recorded in order to test the hypotheses outlined in Chapter III.

HYDROGRAPHY

1. Horizontal distance to water. This variable

was normally measured from the 1:12,000 Corps of Engineers topographic maps. An engineer's rule was used to measure this variable in .1 mile increments. Because of the scales used on the Corps of Engineers and U.S.G.S. maps, this and all other variables are recorded in English rather than metric units.

2. Horizontal distance to the river. This was also measured in .1 mile increments from 1:12,000 Corps of Engineers maps. "River" in this case was defined as the Osage, South Grand, Pomme de Terre, or Sac river.

3. Stream distance from river. This variable differs from the one above in that it is a measurement of stream distance rather than horizontal distance. It was measured by chartometer from the U.S.G.S. topographic maps. In this case, we have considered distance from either the Osage or South Grand rivers, including the upriver distance from them on either the Pomme de Terre or Sac rivers.

4. Rank order of nearest stream. This and other stream rank variables were taken from U.S.G.S. 7.5' quadrangles on which the streams had been rank ordered using the Strahler stream ranking technique (Strahler 1964) described in Chapter III.

5. Rank order stream nearest stream joins. Not all streams of equal rank are really alike. Some first or second order streams may join third order streams, which in turn join fourth order streams, etc. before emptying into streams such as the Osage River; other first or second order streams may directly empty into a major river. Therefore, the rank order of the stream the nearest stream joins was also recorded.

6. Number of bifurcations. This is a count of the number of stream junctures passed as one proceeds

upstream to the site from either the Osage or South Grand rivers. These also were counted from the drainage rank maps prepared on the U.S.G.S. 7.5' topographic quadrangles.

7. Rank of largest stream within one mile of the site. A transparent overlay with a circle representing a one mile radius was superimposed on the drainage rank maps. The rank of the largest ranking stream within one mile radius of the site was recorded.

8. Rank of largest stream within two miles of the site. The same procedure was employed for recording rank of the largest-ranking stream within two miles of the site. These are both horizontal distances.

TOPOGRAPHY

9. Elevation of the site. This was recorded in feet above mean sea level (MSL). Measurements were made from Corps of Engineers topographic maps, unless the site was above 750 feet MSL, in which case the U.S.G.S. topographic maps were used. Since most maps use 10 foot contour intervals and sites are recorded as between two contours, the minimum elevation was recorded.

10. Elevation of water. Also taken from the Corps of Engineers topographic maps, unless above 750 feet. Measurement is made to the nearest part of the nearest stream. Since stream banks also lie between the contours, the highest elevation was recorded.

11. Elevation of river. The same type of measurement as No. 10, except it is to the nearest river (the same river as No. 3).

12. Exposure. This variable codes the direction the site faces on the slope. The circle of 360° is divided into octants of 45° each -- 22.5° on either side

of the direction. A code was also included for sites that were fully exposed – i.e., far enough from the slope (.1 mile) that no shelter can be said to obtain; or on the highest point of a ridge. The remaining variables are concerned with the approximation of a site's territory – i.e., they measure amounts of various types of land and resources within an arbitrary distance of the site. All are made from U.S.G.S. 7.5 minute topographic maps, and are measured with the use of a planimeter.

13. Amount of land within one mile of the site that is on the same side of the river as the site. River again is either the Osage, South Grand, Pomme de Terre, or Sac. Measurements are made of how much of the land within a one mile radius of the site falls on the same side of the river.

14. Total amount of bottomland within one mile of the site. This measurement includes all bottomland within one mile of the site whether on the same side of the river as the site, or whether on the opposite side.

15. Amount of bottomland within one mile of the site, but on the same side of the river. As with several other variables, river includes only the Osage, South Grand, Pomme de Terre, or Sac.

16. Amount of bottomland within one-half mile of the site, but on the same side of the river as the site. The same as No. 15, but with a smaller radius.

VEGETATION

These last two variables approximate the vegetation resources available within an economic distance of a site. Measurements are made by planimeter from overlays of vegetation maps made for the U.S.G.S. 7.5 minute topographic maps.

17. Amount of forest within one mile of the site - on the same side of the river as the site. This includes all bottomland and upland forests and, as before, defines river as the Osage, South Grand, Pomme de Terre or Sac.

18. Amount of forest within two miles of the site - on the same side of the river as the site. The same as No. 17, but for a two mile radius.

Several of the directly coded variables are meaningless as coded, but were measured in order to create new variables in the computer. These new variables are concerned with topography.

19. Elevation of the site above water. Created by subtracting the elevation of the site (No. 9) from the elevation of the nearest water source (No. 10).

20. Elevation of the site above the river. Created by subtracting the elevation of the site (No. 3) from the elevation of the river (No. 11).

21. Percentage of land within one mile of the site that is on the same side of the river. Created by dividing variable No. 14 by the amount of land that is within a one mile radius circle (3.14 mi^2).

22. Percentage of bottomland within one mile that is on the same side of the river. Created by dividing variable No. 15 by No. 14.

Analysis

HYDROGRAPHY

Four hydrographic variables were defined as of interest: (1) horizontal distance to water, (2) the rank of the stream along which the site is located, (3) the side of the drainage on which a site is located, and (4) the relation of the site to either the Osage or South Grand River. It is currently possible to evaluate only (1), (2), and (4).

Horizontal distance to water was hypothesized to be a very important variable in prehistoric site location. On the basis of ethnographic and archeological studies, it was predicted that, if water is indeed an important variable in site location, the frequency distribution of horizontal distance to water will show a curve very badly skewed to the left and highly leptokurtic. Table 23 presents a frequency distribution of this variable, along with skewness and kurtosis values. The assignment of 82.4% of the cases to the category of .1 mile or less from water certainly confirms the prediction of a skewed frequency distribution. The skewness value of 2.94 has a probability of less than one in one hundred of occurring by chance. (Skewness is a measure of the degree to which a curve deviates from normality. "A positive value indicates that the cases are clustered more to the left of the mean with most of the extreme values to the right" [Nie et al. 1975: 185].) The associated kurtosis value of 10.15 also has a chance of less than one in one hundred of occurring by chance, indicating the curve is leptokurtic, or narrow and peaked. (Kurtosis measures relative flatness or peakedness of a curve. A positive value indicates peakedness, or a leptokurtic curve [Nie et al. 1975: 185].)

Chapter III also noted that all water sources are not equal — except perhaps as sources of water. Although this function is important, of course, it is not the only

TABLE 23

Horizontal Distance to Water

Distance (in .1 mi)	Frequency	Percent
.1	392	82.4
.2	65	13.7
.3	14	2.9
.4	4	0.8
.5	1	0.2
	476	100.0

Kurtosis = 10.15 $p < .01$

Skewness = 2.94 $p < .01$

TABLE 24

Rank of Nearest Stream

Rank	Frequency	Percent
1	123	25.8
2	57	12.0
3	35	7.4
4	81	17.0
5	38	8.0
9	52	10.9
10	90	18.9
	476	100.0

function served by a watercourse. Bodies of water may serve as resource zones for fish and mussels, as well as avenues for transportation and communication. In order to quantify the relations of sites to streams of varying magnitude, the Strahler stream ranking system was employed, as explained in Chapter III. Ranking, which is scale-dependent, was done on U.S.G.S. 7.5 minute quadrangles. The Osage River system, however, originates in a part of Kansas for which 7.5 minute U.S.G.S. maps are not currently available, but even if these maps were completed and available it would take considerable time to rank the entire river drainage; therefore, only those streams in the immediate Truman Reservoir vicinity have been ranked. Values for the Pomme de Terre, Sac, South Grand and Osage rivers have therefore not been derived. The Pomme de Terre and Sac rivers have been assigned a value of 9, and the South Grand and Osage Rivers a value of 10.

Table 24 presents the frequency distribution of the rank of nearest watersource variable. It is perhaps not surprising that nearly one-third (29.8%) of the sites are along one of the four major rivers. It is perhaps somewhat more surprising to note that slightly over one-quarter (25.3%) of the sites are on first order streams. In order to more clearly express the spatial distribution of sites on various order streams, Table 25 presents the frequencies of sites along various order streams according to survey stratum.

It may be somewhat more meaningful, however, to arrange sites by the cultural complexes discussed in Chapter VI. Table 26 therefore crosstabulates stream rank with time period for the Stage II components assigned to one of the identifiable complexes. At

TABLE 25

Rank of Nearest Stream - By Stratum

Stratum*/Rank	1	2	3	4	5	9	10
Middle Pomme (9)	15	4	5	1	-	29	-
Lower Pomme (9)	3	0	3	2	-	12	-
Little Pomme (4)	11	2	1	23	-	-	-
Hogles Creek (4)	6	2	0	12	-	-	-
Bear Creek (4)	0	0	0	7	-	-	-
Weaubleau Creek (4)	7	3	0	11	-	-	-
Sac River (9)	0	5	0	0	-	11	-
Salt Creek (4)	3	3	0	4	-	-	-
Gallinnipper Creek(4)	2	1	0	5	-	-	-
Upper Osage (10)	15	8	2	0	-	-	18
Upper Middle Osage (10)	28	7	2	4	-	-	20
Lower Middle Osage (10)	8	4	4	0	-	-	8
Lower Osage (10)	9	2	0	0	-	-	13
Little Tebo (4)	3	5	0	3	-	-	-
Lower Tebo (5)	0	5	9	0	22	-	-
Upper Tebo (5)	2	2	4	5	14	-	-
Lower South Grand (10)	4	0	0	0	-	-	12
Middle South Grand (10)	2	0	0	0	-	-	8
Confluence Area (10)	1	3	2	2	-	-	10
Upper South Grand (10)	3	0	3	0	-	-	1
Deepwater Creek (5)	1	1	0	1	1	-	-
Cooper's Creek (4)	0	0	0	1	1	-	-

*Number in parentheses refers to rank of major stream in stratum.

TABLE 26

Rank of Nearest Stream - By Time Period

	1	2	3	4	5	9	10
Dalton	1	0	0	1	0	0	2
Early/Middle Archaic	2	0	0	0	1	2	1
Late Archaic	5	2	0	4	0	3	3
Middle Woodland	4	3	0	2	1	2	4
Contracting Stemmed	8	5	3	4	1	1	3
Rice-Side Notched/ Arrow	6	6	2	5	3	3	8

first glance, it seems that there is a tendency for Late Woodland sites to be more evenly distributed throughout the drainage network than are the Archaic sites. Such an impression may be false. Similar proportions of Archaic sites, particularly Late Archaic sites, are represented throughout the drainage. The numbers of identified Archaic sites are, however, small. On the other hand, we would expect site burial due to fluvial processes to be more of a problem in the larger (especially the 9th and 10th order streams) valleys than in some of the smaller valleys. Further survey, continued reconnaissance of unknown sites, and comparison of the Truman Reservoir data with data in the literature could help clarify the alternatives.

Chapter III, however, also noted that it seemed misleading to list merely the rank of the stream along which a site was located without also recording the rank of the stream into which that stream flows. The example given in Figure 6 in that chapter considered a site on a first order stream that joined another first order stream to create a second order stream, etc., up to a fifth order stream — as compared to a site on a first order stream flowing directly into a tenth order stream. In essence, such a consideration is a measure of the remoteness of the site from the main stream. Table 27 crosstabulates the rank of the stream along which a site is located and the rank of the stream which the closest stream flows into for sites not already on a tenth order stream. The top two lines of that table are probably the most interesting, and show that many prehistoric sites are indeed located well up into stream networks.

TABLE 27

Rank of Nearest Stream - By Rank of Stream into Which It Flows

		RANK INTO					
		2	3	4	5	9	10
RANK ON	1	39	10	27	2	14	31
	2	6	11	13	3	6	16
	3	-	0	6	13	0	16
	4	-	-	0	7	37	37
	5	-	-	-	0	0	38
	9	-	-	-	-	0	52

The remoteness of the sites from the major rivers may be further examined by analysis of the distance upstream variable. This variable measured the river distance upstream from either the South Grand or Osage River. A frequency distribution of this variable, for those sites not on either the Osage or South Grand River itself, is given in Table 28. It is obvious that over half of the sites not already within the major river valley are within five miles of a major valley, and over three-quarters of them are within ten miles of one of those valleys. In Table 29, this variable is categorized and broken down according to the rank of the stream which the site is nearest. Nearly three-quarters (74.0%) of the sites on first order streams are within five miles of a 10th order stream, while most of the sites more than 15 river miles from either the South Grand or Osage River are on either a fifth or ninth order stream (i.e., Tebo Creek, Pomme de Terre River, or Sac River).

Stream distance aside, Table 30 lists frequency distributions for magnitude of the largest stream within one mile of the site, and within two miles of each site. Both basic frequency distributions, and frequency distribution adjusted to account for those sites directly on a tenth order stream are listed. All but three sites are within at least one mile of a fourth order stream, and nearly three-quarters (72.8%) of those sites not on a tenth order stream are within two miles of one. One caution that must, in fairness, be interjected here is that a possible bias is introduced by reservoir acquisition procedures. Particularly in the upper reaches of the reservoir, and in those areas in which the terrain is not particularly rugged and few ridge tops are acquired, it is probable that the confinement of the

TABLE 28

Upstream Distance from Osage or South Grand River

Distance (in River Mi)	Frequency	Percent
0-5	222	57.5
6-10	72	18.6
11-15	37	9.6
16-20	29	7.5
21-25	21	5.4
26-30	3	0.8
31-35	2	0.5
	386	100.0

TABLE 29

Upstream Distance by Rank of Nearest Stream

	1	2	3	4	5	9
0 - 5	91	40	18	52	13	8
5 - 10	11	11	9	14	12	15
10 - 15	17	2	1	9	3	5
15 - 20	3	2	2	3	10	9
20 - 25	1	2	5	3	0	10
25 - 30	0	0	0	0	0	3
31 - 35	0	0	0	0	0	2

TABLE 30

Order of Largest Stream Within 1 and 2 Mi. of Site

Rank	Frequency		Percent	
A. 1 Mile				
3	3	3	0.6	0.8
4	88	88	18.5	22.8
5	66	66	13.9	17.1
9	104	104	21.8	26.9
10	215	125	45.2	32.4
	476	386	100.0	100.0
B. 2 Miles				
4	59	59	12.4	15.3
5	46	46	9.7	11.9
9	96	96	20.2	24.9
10	275	185	57.8	47.9
	476	386	100.0	100.0

survey to acquisition boundaries biases the survey to larger order streams and smaller order streams near them. Clarification of the trends suggested by the Stage II survey data in the Truman Reservoir will therefore of necessity come when and if archeological survey is carried out in areas away from the major drainage (and away from Corps of Engineers acquisition areas). The present survey will therefore have collected data that could be used for a direct comparison of site location patterns on a more inclusive scale.

TOPOGRAPHY

In Chapter III it was proposed to study patterning of sites in relation to three topographic variables: (1) elevation above the river, (2) exposure, and (3) relation of the site to various landforms surrounding the site. Data are currently available to examine all three variables.

Table 31 presents a frequency distribution of the elevation of sites relative to one of the rivers. It is probably not surprising that most sites are not high above the river. A bias toward survey closer to the river (and, therefore, at lower elevations) is engendered by confinement of survey to Corps of Engineers acquisition areas, and may influence the results. It seems likely, however, that the distribution of sites within acquisition areas is meaningful for regional trends.

Of more interest to an interpretation and explanation of prehistoric human behavior, however, is how these elevations may relate to other site selection factors such as security from floods, or desire for an overview.

TABLE 31

Elevation Above the River

Elevation (in ft)	Frequency	Percent	Cumulative Percent
0	42	8.8	8.8
10	108	22.7	31.5
20	79	16.6	48.1
30	46	9.7	57.8
40	35	7.4	65.1
50	27	5.7	70.8
60	25	5.3	76.1
70	25	5.3	81.3
80	18	3.8	85.1
90	13	2.7	87.8
100	11	2.3	90.1
110	12	2.5	92.6
120	12	2.5	95.2
130	8	1.7	96.8
140	5	1.1	97.9
150	1	0.2	98.1
160	3	0.6	98.7
170	5	1.1	99.8
180	1	0.2	100.0

We are currently not in a position to be able to evaluate overview. Flood risk can, however, be evaluated in a rather crude manner. Flood records are available for three gaging stations in the reservoir area: the Osage River at Osceola, the Pomme de Terre River at Hermitage, and the South Grand River near Brownington (Sandhaus and Skelton 1968: 101-131, 135-136, 139-140; flood records are also available for a number of other stations but they are either of very few years duration or are placed where river flow is regulated by dams). Values of the stream discharge at various recurrence intervals are available (Sandhaus and Skelton 1968: 266) and can be roughly converted to heights above mean sea level (Table 32). Elevation calculations were made in such a way that the site would be within the given elevation and the next lower value (in other words, each value of elevation of Table 32 should be read as "less than or equal to"), and it is apparent from a comparison of Tables 31 and 32 that nearly half the sites are within the 5-year flood plain. It must be noted, however, that the regimen of the streams in the Osage River basin has not been stable during the Holocene and, if anything, these figures should grossly underrepresent the actual flood risk attending the occupation of many recorded sites, particularly those occupied during the Dalton or Archaic periods. For example, the terrace on which (or in which) many of these sites are found should have been the flood plain itself at the time of occupation (cf. Haynes 1976: 58; Johnson, this report, Vol. X, Pt. IV: 69).

Exposure is used here to refer to the direction a site faces. It may be an important factor in warmth or protection from prevailing winds. Table 33 tabulates

TABLE 32

Approximate Heights of Flood at Specified Recurrence Intervals (in Ft. MSL)

Recurrence Interval (in yr)	Osage River at Osceola	Pomme de Terre River at Hermitage	South Grand River Near Brownington
1.2	695.2	742.7	692.5
2.33	703.7	750.5	701.6
5	709.5	754.0	706.6
10	712.1	757.1	710.7
25	714.5	760.3	714.0
50	717.5	763.1	716.2
Height of River Bank	690	740	690

TABLE 33

Exposure

Direction	Frequency	Percent
North	38	8.0
Northeast	24	5.0
East	56	11.8
Southeast	34	7.1
South	66	13.7
Southwest	30	6.3
West	50	10.5
Northwest	18	3.8
Open	160	33.6

the exposure of the 476 Stage II in-transect sites. One third of the sites are open - i.e., they were either on ridge tops or on terraces and were far enough away from the bluffs so that they were judged to not have any significant protection from the bluffs. Of the remaining 2/3 of the sites, it is probably not surprising that the largest percent face south - in which direction they would be most likely to get direct sun - or east, the direction most protected from prevailing winds. (As a further observation, it should be noted that coding was done by at least three different individuals and has an apparent bias toward the cardinal rather than the sub-cardinal directions.)

Perhaps one of the most useful topographic variables is the relation of sites to the major landforms in the region. Earlier in this chapter, definitions of the variables and procedures for the measurement were detailed. Some preliminary examinations of these variables are given here.

Figure 19 presents a histogram of the frequency distribution of the amount of land within one mile of a site that is on the same side of the river as the site. This is expressed as a percent of the 3.14 mi^2 within a one-mile radius of the site. The curve is skewed to the right (skewness = -.797, $p<.01$) but does not exhibit significant kurtosis (kurtosis = .260, $p>.05$). Over one-quarter of the sites (27.1%) have all the land within one mile of the site on the same side of the river as the site. Only 67 sites (14.1%) have less than one-half the land within one mile of the site on the same side of the river as the site, while over one-third (n = 186, 39.1%) have one-half to three-quarters of the land within one mile on the same side of the river. This

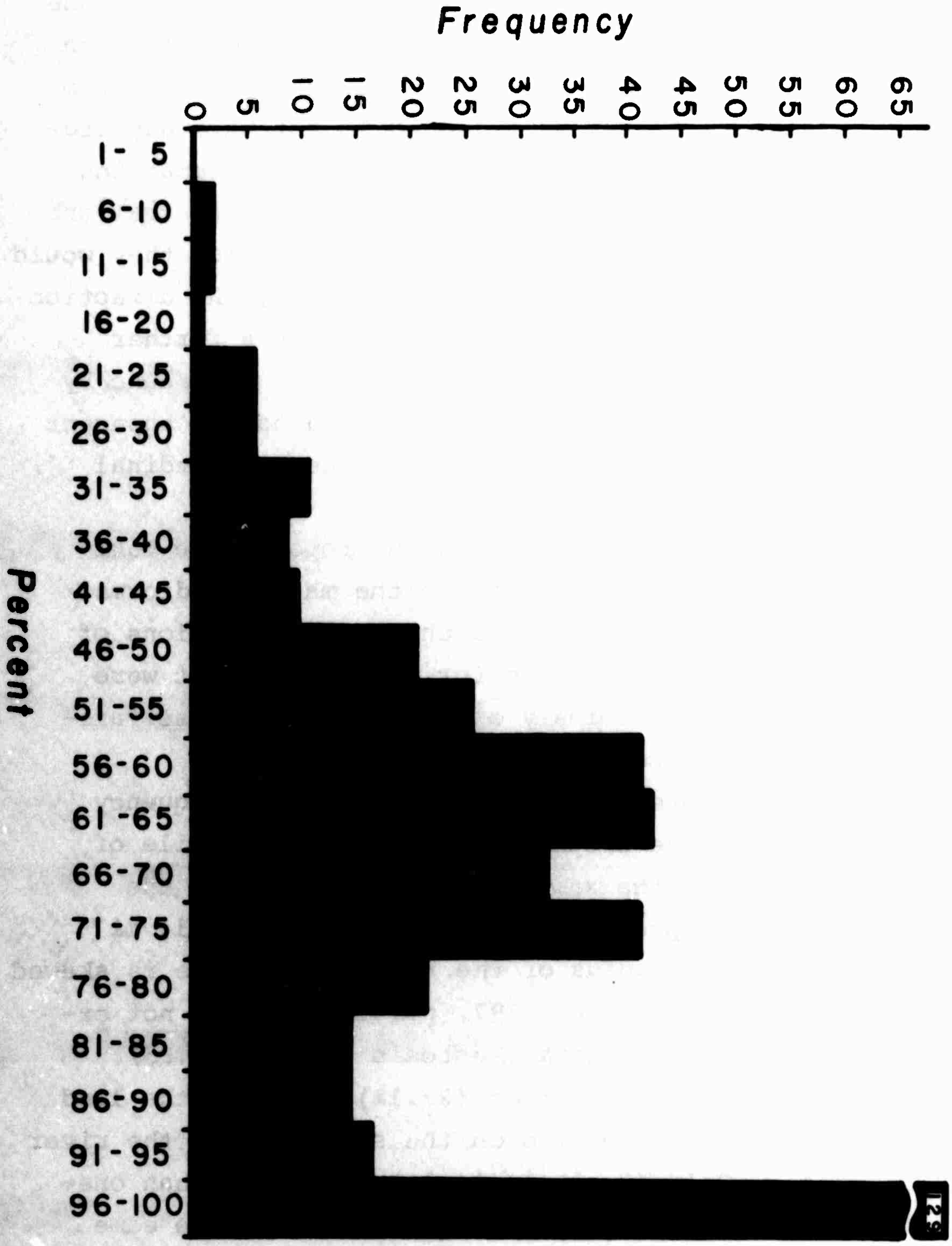

Figure 19. Amount of Land Within 1 Mile of Site — Same Side of River.

would probably be expectable for sites generally on the terraces of the major streams. The value of this variable has a statistically significant (but not particularly high) correlation with the measurement of horizontal distance to water ($\underline{r}$ = .41, p<.001), suggesting that its value is very little controlled by how far from the river the site is located.

Possibly more informative than analysis of the amount of land within one mile of the site is the analysis of the kind of land immediately surrounding each site. For present purposes, it has been feasible only to divide the land into bottomlands and uplands. The differentiation of floodplains and terraces in the bottoms is difficult to make from topographic maps alone, and very little of the terrace system of the reservoir as a whole has been mapped (see Haynes, this report, Vol. X, Pt. II: 24, and Johnson, this report, Vol. X, Pt. IV). Differentiation of the uplands into valley slopes and summits is also difficult in the extremely dissected topography that characterizes much of the area. Therefore, the present analysis will use only the two major categories of bottomlands and uplands to describe site locations.

Figure 20 presents a histogram of the calculated value of the amount of land within one mile of the site that is bottomland – on whichever side of the river this bottomland falls. The curve shows a pronounced mode in the 21-30% area. It may be more meaningful in terms of evaluation of readily accessible land to evaluate how much of this bottomland within one mile of the site is on the same side of the river as the site, and thus is accessible without the major energy expenditure of crossing the river. Figure 21 graphs the frequency distribu-

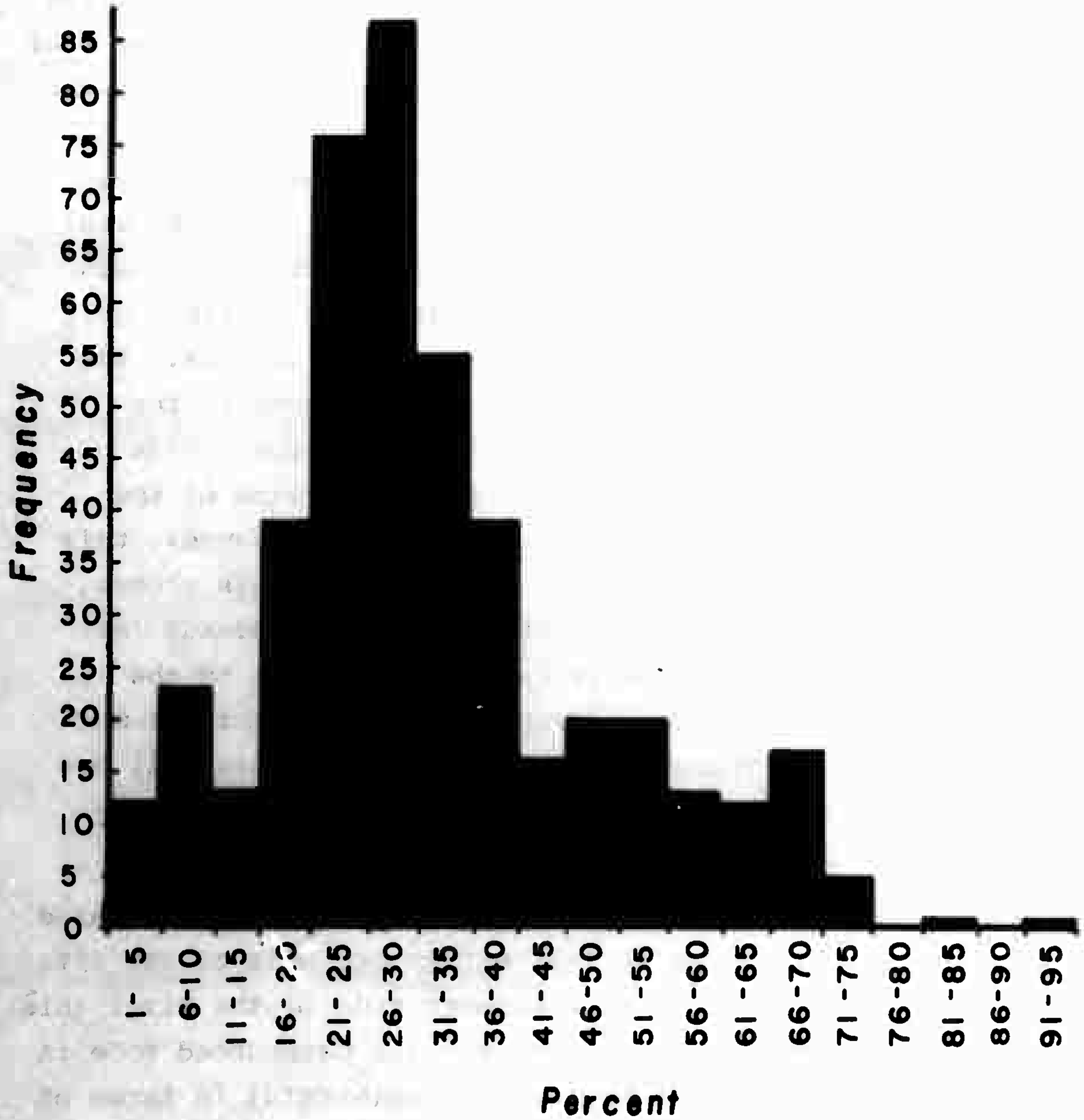

Figure 20. Amount of Bottomland Within 1 Mile of Site.

tion of this variable. It is quite clear from this figure that in many cases more than half of the bottomland within one mile of the site is on the same side of the river as the site, suggesting a selection for that side of the river that has the widest bottoms.

In Table 34, however, this variable is broken down by time period. Unfortunately, very small sample sizes hamper a meaningful evaluation of trends in this variable. In general, however, it seems that perhaps the trend through time is toward a greater amount of bottomland within one mile of the site being on the same side of the river as the site itself.

VEGETATION

The last class of variables to be examined is that of the relation of sites to the floral environment. As noted in Chapter III, this is to be done via analysis of the areas of various resource zones within a given radius of the site. In the present analysis, only the values of the amount of forests within one and two miles of the site are currently available and these are for slightly less than one-half of the Stage II sites.

Frequency distributions are given in Table 35 for those sites for which data are available. It is clear that the majority of sites for which data have so far been collected are located so that they are well within the forest and are surrounded by reasonably extensive tracts of forest. When complete data become available, it will be of interest to examine whether or not there are differences throughout either time or space (or both). Examination of such trends at this time would be premature. It may be noted, however, that sites for

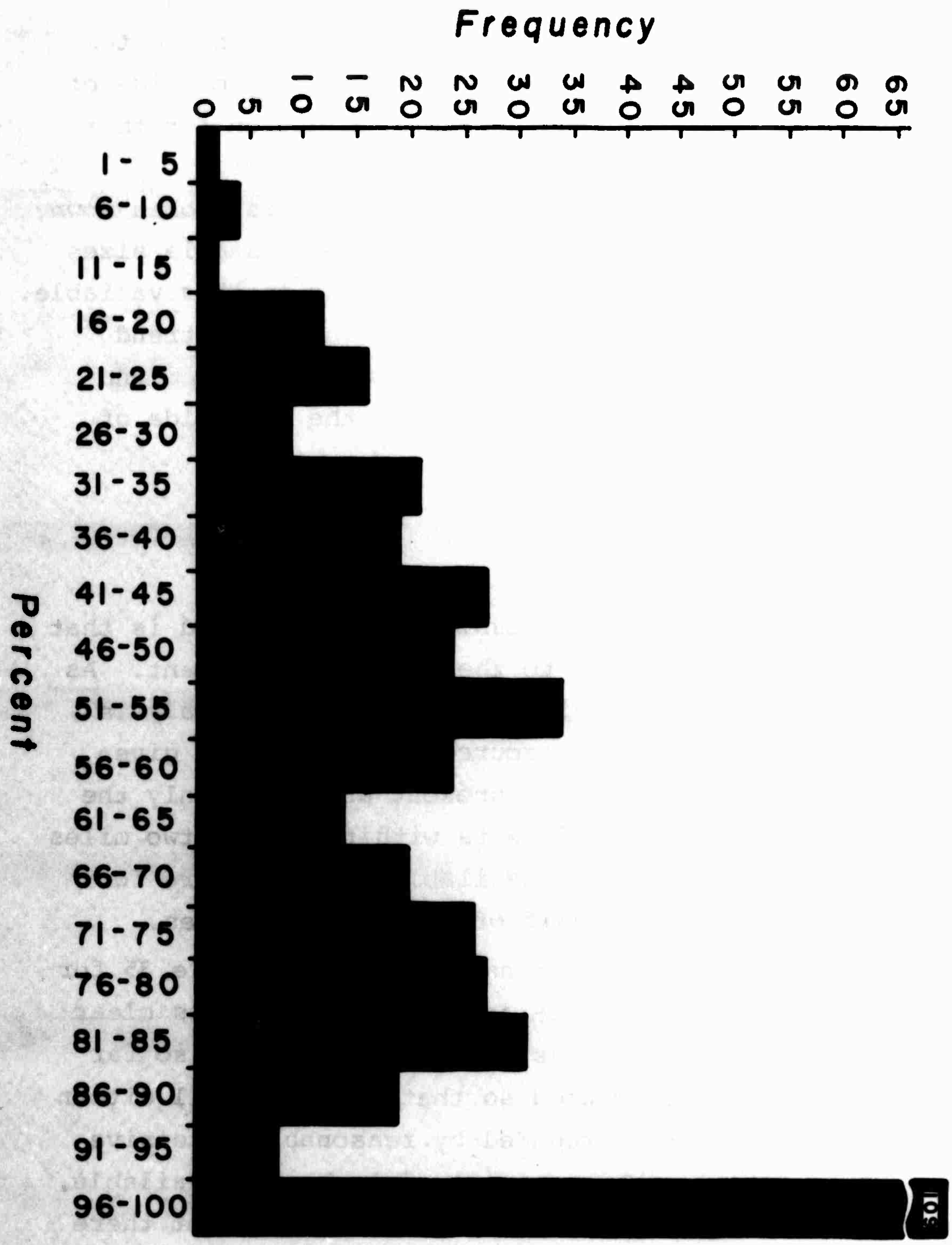

Figure 21. Amount of Bottomland Within 1 Mile of Site — Same Side of River.

TABLE 34

Mean Amount of Bottomland Within 1 Mi. – Same Side of River – By Time Period (Expressed as Percent)

Period	Sample Size	Mean	Standard Deviation
Dalton	4	2.9	1.5
Early/Middle Archaic	6	3.3	2.6
Late Archaic	17	5.4	2.2
Middle Woodland	16	5.2	2.1
Contracting Stemmed	24	5.4	2.3
Rice Side-Notched-Arrowpoint	31	4.7	2.6

TABLE 35

Frequency Distribution of Forests
Within 1 Mile and 2 Miles of Site

1 Mile			2 Miles		
Area	Frequency	%	Area	Frequency	%
0.0 - 0.5	0	0	5.5 - 6.0	1	.5
0.6 - 1.0	3	1.5	6.1 - 6.5	0	0
1.1 - 1.5	6	2.9	6.6 - 7.0	1	.5
1.6 - 2.0	6	2.9	7.1 - 7.5	4	1.9
2.1 - 2.5	22	10.6	7.6 - 8.0	3	1.4
2.6 - 3.0	62	30.0	8.1 - 8.5	6	2.7
3.1 - 3.5	108	52.2	8.6 - 9.0	12	5.5
	207		9.1 - 9.5	13	6.0
			9.5 - 10.0	7	3.3
			10.1 - 10.5	9	4.2
			10.6 - 11.0	36	16.4
			11.1 - 11.5	28	12.8
			11.6 - 12.0	31	13.7
			12.1 - 12.5	32	14.7
			12.6 - 13.0	36	16.4
				219	

which data are available occur all over the reservoir — in the Ozark Highland as well as the Western Prairies, and on smaller streams as well as the major rivers. It may be that the general trend of the frequency distribution in Table 36 will be confirmed when all sites are analyzed.

Discussion

The present analysis reported here is clearly preliminary. Frequency distributions and some cross-tabulations have been presented for most variables. These are, however, primarily descriptive statistics. In a few cases simple statistical hypotheses have been evaluated as a test of an archeological (i.e., behavioral) proposition. The results of these operations are far from conclusive. Some of the propositions about human behavior have been tentatively confirmed, and many others remain untested. Further, in the instances in which frequency distribution are broken down by time periods, no clear temporal trends are apparent.

Univariate and bivariate statistics are not always the most efficient approach to discerning patterned relationships within a body of data. Therefore, it may not be surprising that clear indications of differential site placement over either time or space are not readily discernible. Further consideration of human behavior suggests, however, that there is no reason that such differences should be apparent with simple statistics. Models of decision factors affecting prehistoric site location (e.g., Hill 1971: 56) always specify multiple factors involved in the site selection process. Further, depending upon prevailing climate, resource distribution and, of course, cultural preferences for certain resources or combinations of resources, differential weighting of the factors may occur. A realistic behavioral analysis of site locations and, ultimately, of the spatial component of the settlement system, will therefore need to account for a number of theoretically relevant factors at once. Experience also suggests that some temporal and spatial control, i.e., holding time and/or space as independent variables in the analysis will help to discern temporal and/or spatial trends that may be distorted when all components are considered simultaneously. For example, use of temporal controls and multivariate procedures in the analysis of site locations in a small area of the Sac River downstream from the Stockton Dam was the only way any meaning was introduced into the analysis. When temporal controls were applied, highly meaningful patterns emerged from an analysis that otherwise seemed confused (Roper 1977: 75-96, 112-123).

It will also be advantageous to use the Stage I survey data to help confirm some of the trends in the Stage II survey data. A comparable data file is being generated for Stage I but is not yet complete enough to be able to carry out analysis beyond the reliability analysis reported in Chapter V.

Completion of these data files is planned for the first year of the mitigation program in the Truman Reservoir. Once these files are complete, the analysis of the data, following the guidelines of Chapter III, will be completed. At that time, it should be possible to construct models of settlement systems in the central Osage River Basin and to make comparisons with other areas of Missouri and the broader Ozark-Plains area in general.

CHAPTER VIII

ESTIMATING THE CULTURAL RESOURCE BASE OF THE HARRY S. TRUMAN RESERVOIR

Very early in the survey it became obvious that, given available time and funding, it would be impossible to completely walk all of the 166,000+ acres being acquired by the Corps of Engineers. Further, it would be completely naive to assume that even if all of the acquisition area were walked that all sites would be recorded. For any of a variety of reasons, including site burial and invisibility of sites under certain ground cover conditions (not to mention the problem of defining what is to be called a site), the archeologist never records all the sites in an area. For example, House and Schiffer (1975: 41) have used the illustration of the Field Museum survey of a 5.2 mi^2 area in Arizona. This area was systematically walked at 10' intervals during the summer of 1967.

> One would think that no site could elude such thorough scrutiny. In fact, however, additional sites of two new types were discovered in 1969 and 1971 in that same 5.2 square mile area! (House and Schiffer 1975: 41).

The decision to be made in the Truman Reservoir survey was not whether or not to sample, but rather how to sample.

Rationale for Sampling in a Regional Archeological Survey

With an increasing concern on the part of archeologists with the study of settlement patterns, and the increasing need for archeological knowledge of regions for cultural resources management purposes, the issue of regional sampling has gained increasing prominence in American archeology during the past decade. Lewis Binford (1964) was one of the first archeologists to argue for regional sampling. In his "A Consideration of Archaeological Research Design" he has given an example of the type of problem encountered by archeologists working with the settlement systems of a region:

> For instance, I recently wanted to demonstrate that most of the sites in a particular area were located adjacent to streams. This was impossible because I had no data as to where the archaeologist reporting on the area had concentrated his survey efforts. Was the failure to report sites in areas not adjacent to streams the result of sites being absent, or was it simply a lack of investigation in those areas not adjacent to streams? (Binford 1964: 427).

The kind of problem Binford describes in this passage is a common one in considering the distribution of archeological sites. Frequently, the archeologist is in a position to want to estimate parameters of the population of sites in the region of interest. For example, if it is of interest to know the distribution of sites of various sizes, or perhaps the relation of a particular size of site to the drainage system, or even simply to estimate the number of sites in a given area, it is necessary to have some knowledge of the reliability of the sample of sites used to estimate these parameters. In some cases, there may be enough information already available to do so with conventional survey techniques or data already at hand.

In other cases, so little is known about the archeology of a region that there is no way to evaluate how a conventionally drawn sample of sites estimates the parameters of interest. If it is possible to survey (i.e., walk) the entire region of interest, it is the best thing to do, of course. If it is not, as is often the case, then some kind of sampling design is necessary. Such a design could consist of nothing more than walking "the most likely places" to find sites. This surely will produce a large number of sites, but it will be difficult to extract much valuable and supportable data from them. The same comment could apply to surveying along roads, or only in cultivated fields (see House and Schiffer 1975: 40-41 for a discussion of survey intensity). The basic issue is not always how many sites one can record in a given unit of time, however, but how much information can be recorded in the same period of time. It is for this reason that many archeologists carrying out regional surveys in which it is impossible to survey the entire area have found it efficient and informative to use some sort of probability sampling design. Such a design may well record fewer sites, but it will do so in a manner which will permit the archeologist to make supportable statements about the cultural resource base of the region. Dwight Read (1975: 47) has stated the case:

> To use probability sampling . . . is tantamount to acknowledging that there is a lack of sufficient information to predict location and contents of sites. To reject probability sampling is to assert either that the determinants are known or that the potential bias can be

> measured and controlled. But if this is not true, intuitive sampling of necessity introduces uncontrolled bias into the set of excavated data. Contrary to this, probability sampling does not introduce bias or at least it does not introduce bias for which control cannot be made. But more important than this is that it forces an evaluation of what is known and what is unknown (Italics in original).

Anyone confused on the basic issue of the purposes and products of probability sampling as opposed to traditional sampling would do well to examine the imaginary dialogue between the two Mesoamerican archaeologists that Flannery (1976: 133-135) has used to illustrate this very point. The conclusion of the dialogue suggests that (Flannery 1976: 135):

> Probability sampling isn't the best way to find sites — it's just the best way to get a <u>representative</u> sample of sites, if you can't go for the whole universe . . . . (Italics in original).

Recognizing the rather poor state of archeological knowledge in the Truman Reservoir (except, of course, for a few sites) and the impossibility of covering the entire acquisition area, the decision was made to commit about half of the fieldwork time to a probability sampling design. The design and execution of this survey, as well as the results, have been previously described. The purpose of this chapter is to extrapolate from the results to estimate the archeological resource base of the Truman Reservoir.

An Estimate of the Archeological Resources of the Truman Reservoir

Two approaches can be taken to projecting the number of sites in the Truman Reservoir: (1) division of the number of sites recorded during Stage II survey by the actual sampling fraction (or multiplication of the number of sites recorded by the reciprocal of the sampling fraction), and (2) the same, but for each sampling stratum individually. Straight calculation of the number of sites based on the total number of sites recorded and the overall sampling percent yields:

$$476 / .0979 = 4862 \text{ sites}$$

The second technique might provide a slightly more refined means of estimating the number of sites in the reservoir since it accounts for varying densities along different magnitude drainages. The following tabulation therefore lists site densities and projected numbers of sites for each survey stratum (Table 36). The total of 4648 is only slightly lower than than obtained by considering all the area at once. It is suggested that about 4500 to 5000 archeological sites are present within the Corps of Engineers acquisition area for the Harry S. Truman Reservoir.

Discussion

The above estimate must be tempered with several notes of caution, however. First, there is some bias from surveyor to surveyor in defining site limits. Some surveyors are "lumpers," and others are "splitters." Some of the apparent differential densities of sites in

TABLE 36

Projected Numbers of Sites in Survey Strata

Stratum No.	% of Area Surveyed	No. of Sites in Transects	Density per km^2	Density per mi^2	Projected No. of Sites
1	12.57	54	11.49	29.35	430
2	13.04	20	8.06	20.62	153
3	10.65	37	20.79	53.31	347
4	16.83	20	7.58	19.42	119
5	7.44	7	15.22	38.89	94
6	13.58	21	18.58	47.73	155
7	11.80	16	7.07	18.09	136
8	17.44	10	13.70	34.48	57
9	12.64	8	9.96	25.50	63
10	9.70	43	10.05	25.75	443
11	10.17	61	15.72	40.24	600
12	8.73	24	3.93	10.06	275
13	8.11	24	7.23	18.50	296
14	7.93	11	6.01	15.39	139
15	11.49	36	11.22	28.73	313
16	7.12	27	8.98	23.00	379
17	7.60	16	3.93	10.05	211
18	6.57	10	2.95	7.56	152
19	11.56	18	6.16	15.76	156
20	11.07	7	0.95	2.44	63
21	10.59	4	1.34	2.74	38
22	6.92	2	2.90	7.41	29
	9.79	476			4,648

different survey strata may be correlated with the identity of the surveyor.

Second, it should be noted that the entire survey was conducted during a drought. The chances of finding even relatively dense sites are low in fields with freshly turned soil, especially those which have not been rained on. A drought year simply lengthens the amount of time a field is in poor survey condition. Many fields did not receive significant moisture until several months after they were cultivated in 1976. Therefore, the estimates of the number of sites in the reservoir area should surely be taken as <u>conservative</u>.

Third, buried sites are not accounted for in this estimate. At the present time, so few buried archeological sites have been recorded that projecting the extent of the buried resource base is impossible. Therefore, the above estimates are of <u>surface resources only</u>. Given the expensive and time-consuming nature of subsurface survey, it is probable that although it may be possible to locate more such components, the actual extent of this portion of the resource base will never be known or accurately estimable.

CHAPTER IX

SUMMARY AND RECOMMENDATIONS

Summary

In June 1975, the American Archaeology Division of the University of Missouri-Columbia undertook a survey of the archeological resources of the Harry S. Truman Reservoir area in Benton, Hickory, Henry, and St. Clair counties, southwestern Missouri. Previous investigations had been carried out in the reservoir area since 1959 (see Roper 1975b: 1-7 for a summary), but had been mostly oriented toward intensive excavations at a few sites, particularly Rodgers Shelter (see Wood 1976 for a summary). Archeological investigations had also been conducted at the nearby Pomme de Terre (Chapman 1954, Wood 1961) and Stockton (Powell 1962) lakes. From this work, it was possible to briefly synopsize the basic archeological knowledge of the central Osage River Basin and to pose a large number of specific questions for research throughout the program of survey and mitigation. In keeping with the theme of the past investigations, particularly those at Rodgers Shelter (cf. Wood 1976b: 9), a culture/environmental theme was emphasized. With such an orientation, a basic goal of the survey was to examine prehistoric settlement systems in the central Osage River Basin using general principles of human behavior and environmental interaction to guide the investigations and analysis.

Fieldwork spanned a 15 month period from mid-June through November 1975 and March through mid-December 1976. The first stage of the survey concentrated on traditional reconnaissance of river bottoms throughout the reservoir area but with special attention to the Pomme de Terre River Valley, plus survey of highway and road relocations and borrow areas. The second stage concentrated on a transect survey of approximately 10% of the acquisition area. Transects were chosen randomly after the total acquisition area had been divided into 22 survey strata.

A total of 1428 prehistoric sites, only 65 of which were previously reported, were recorded. These sites document the prehistoric sequence from the Dalton period through Late Woodland/Central Plains manifestations. Cultural identifications are made by cross-dating from identifiable projectile points and are subject to confirmation in later phases of the archeological investigations in Truman Reservoir. Settlement pattern analysis at this point is only preliminary, however, and trends within the data are not clear.

Recommendations

The recommendations here are of three kinds: (1) those concerning the suitability of the archeological resources for inclusion in the National Register of Historic Places, (2) for further reconnaissance and survey, and (3) those for mitigation of the impact of the reservoir on the archeological resources of the central Osage River Basin.

NATIONAL REGISTER RECOMMENDATIONS

Our recommendation for the National Register of Historic Places is that the Harry S. Truman Reservoir be nominated as a district. Previous surveys in the reservoir recorded over 300 site locations (see Roper 1975b: 8-16 for a listing); the present survey recorded over 1400. In other words, roughly 1700 archeological sites are known within the reservoir. Projections suggest that several thousand sites on the surface alone are as yet unrecorded. The prehistoric archeological resource base is, therefore, immense. Most sites taken by themselves would do little to elucidate culture-history or cultural dynamics. The creation of a National Register district would recognize this potential.

RECOMMENDATIONS FOR FURTHER SURVEY

There are two reasons for recommending that further reconnaissance and survey be conducted within the Harry S. Truman Reservoir. First, a complete reconnaissance of the surface was impossible, and a subsurface survey was barely practical. The area surveyed and the intensity with which it was surveyed are felt to be adequate for estimating the extent of the surface archeological resources of the Truman Reservoir. When the aggregate of recorded sites is broken down by time and/or space, it becomes apparent (see especially Chapter VII) that inferences at this scale are based on a sample of sites that is generally too small to be meaningful.

The second reason for recommending some further survey is that the survey reported herein was performed entirely during a drought. It is a virtual certainty that the recovery of projectile points and pottery — the two classes of debris most used for chronological purposes — was decreased by poor visibility, particularly in cultivated fields. Many recorded sites yielded no diagnostic remains at all, compounding the problem of a small number of sites in each temporal and/or spatial group.

Further survey should be of two types: (1) in additional transects, and (2) through subsurface survey. It will never be feasible, both because of constraints of time and limitations of finances, to walk the entire reservoir. The decision as to what areas should be walked is between completely covering areas such as public use areas, or the permanent pool, etc., or covering selected areas in such a manner as to provide a representative sample of sites for predictive purposes. The latter approach is recommended as the strategy most consistent with the work already done, and most productive of useful archeological knowledge.

Survey of buried archeological resources has barely begun. Few such resources are recorded as yet and it is impossible to obtain enough information from them to be able to predict where we would find such sites (except to know in which sediments such resources could be expected [cf. Johnson, Vol. X, Pt. IV: 69]). It would be impossible to explore for buried sites in more than a very small segment of the reservoir and is, of course, most efficiently carried out in areas in which the sediments have been mapped. It is recommended that several small areas interspersed throughout the reservoir be selected, mapped, and cored or trenched to explore for buried archeological sites. One of these areas, already mapped, should be centered around the Avery Bridge on the Pomme de Terre River in extreme southern Benton County. Other areas should be on other major rivers in the reservoir.

Mitigation

Mitigation of the impact of reservoir construction on the archeological resources of the Truman Reservoir will be a formidable task and, given strictures on remaining time, will never be complete. The mitigation program, however, should include both culture-historical and topical concerns.

CHRONOLOGY

The chronology of the prehistoric occupations of the Truman Reservoir is still poorly known. The sequence at Rodgers Shelter is a useful starting point but is limited to one site in one part of the reservoir. There are gaps in the Rodgers Shelter record, however, and regional variability can be expected. Further, the upper stratum at Rodgers compresses the Late Archaic and Woodland part of the sequence sufficiently that fine control of the sequence is difficult.

The Truman Reservoir is known to contain a nearly continuous 11,000 year cultural record. Many gaps remain in our knowledge of this record, however. We identify some of these questions below.

Dalton – The survey has documented the fact that Rodgers Shelter is indeed <u>not</u> the only Dalton period occupation in the Truman Reservoir, and has countered Chapman's (1975: 99) suggestion that the Western Prairies region was not occupied by Dalton period hunters. So far, however, very little is known of the Dalton tool assemblage in this part of Missouri, and nothing at all is known of the nature of this occupation. Recovery of information, if possible, on the Dalton occupations beyond Rodgers Shelter is an important contribution of the mitigation program.

Early and Middle Archaic — The survey collections have produced a surprising number of specimens identified as Early or Middle Archaic in age. Some of these types are sparsely represented or unrepresented at Rodgers Shelter. More such sites undoubtedly lie buried in Holocene deposits along the major streams in the reservoir. Little is known of the nature of Early and Middle Archaic occupations in southwestern Missouri beyond Rodgers Shelter. This period should, however, be important in understanding cultural dynamics under conditions of environmental stress. The establishment of the Ozark deciduous forest following the close of the Pleistocene, followed by the onset of Altithermal conditions about 8600 years ago (McMillan 1976: 228) is reflected in the cultural record at Rodgers Shelter. Such a shift should similarly be reflected in the cultural record of the entire reservoir.

Although we know that there were occupations contemporaneous with those at Rodgers Shelter throughout the reservoir, we know little about the total settlement cycle of these systems. Information on the response of the cultural system to environmental stress may therefore be forthcoming and should be looked for. It will also be important to look for components contemporary with the late Altithermal cultural hiatus represented at Rodgers Shelter. Phillips Spring may be one such component. It would be important to the study of cultural dynamics to know if there are other such components and, if so, how they articulate with one another.

Late Archaic – The survey collections also contain a great deal of material referable to the Late Archaic period. The distribution suggests some inter-regional variability during the Late Archaic. Further surveys and excavations may help clarify the chronology and nature of the Late Archaic occupations.

Woodland – The local Woodland chronology is not at all clear. Few radiocarbon dates are available, and stratigraphic sequences in shelters are only suggestive. It is further apparent that there is strong regional differentiation between the Ozark Highland and the Western Prairie. Specifically, the Western Prairies appear to have had occupations related to the Pomona Focus of eastern Kansas (cf. Witty 1967), the Steed-Kisker Focus of the Kansas City area (Wood 1968), and the Caddoan occupations of northeast Oklahoma (McMillan 1968, Wood and Pangborn 1968). The nature of these occupations is not as yet clearly understood. They seem to be ephemeral occupations, however, and to follow an in place Woodland period occupation in the Truman Reservoir area. In other words, it appears that the Western Prairies shift function – from supporting a complete settlement system to being an area used only for specific purposes by groups whose permanent habitations were west of the reservoir area. This shift seems to correspond in time with the shift to greater practice of horticulture and the beginnings of the Central Plains Tradition in the Central Plains. The demonstration of this shift in use of the Western Prairies Region is important not only to understanding the archeology of the area, but also is important in understanding the dynamics of culture change in the Central Plains. No other river basin segment is presently known to contain a similarly eclectic cultural record for this late prehistoric time period.

The Ozark Highland, meanwhile, seems to document no such shift in function. Ceramic assemblages are very different and seem to show no influences, either physically or ideationally, from areas to the west. The possibility should therefore be explored that the Late Woodland lasts nearly to the time of historic contact in this area.

Consequently, the central Osage drainage is an important area for research on this period. Demonstration of the above postulated culture-historical construction will require: (1) demonstration of Woodland habitation throughout the reservoir area, (2) establishing a chronology of both Woodland and Central Plains Tradition occupations, (3) a determination of the nature of the Central Plains occupations of the Western Prairies, and (4) demonstrating the lack of Central Plains occupation in the Ozark Highland.

TOPICAL CONCERNS

It is suggested that topical concerns cross-cut this temporal continuum. The cultural-environmental theme should remain a central concern to provide maximal continuity not only with the survey, but with the previous decade of research in the Ozark Highland. Subcontracts for geomorphic and pedological work should be continued, and maximal articulation with all on-going cultural resources work in the reservoir should be maintained.

Settlement patterns and settlement systems have been a major focus of research for over a decade and a half, and the survey has continued to collect data useful in settlement system analysis. The mitigation stage of the investigations should include the opportunity to complete the detailed analysis of these data. This should be complemented by the analysis of: (1) collections from sites excavated during mitigation work, and (2) collections made during the last 18 years that have either not been analyzed or have been analyzed from a different perspective. This latter work should include a detailed analysis of both artifacts and osteological remains from burial mounds excavated in the area.

Behavior and cultural dynamics (and statics) have also been suggested as topics of considerable theoretical interest in integrating and guiding the collection and analysis of data during the last several years of archeology in the Truman Reservoir. Both goals are in concert with the demands of modern professional archeology, and both are discussed more fully at the conclusion of the separate papers comprising Volume V.

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